MANUAL CHAPTERS

Introduction 0
Safety 1
Identification 2
Operation 3
Care and maintenance 4
Driving 5
In case of emergency 6
On-the-road emergency repairs 7
Exceptional operating conditions 8
Vehicle data 9
Index 10

OPERATING MANUAL

COACH

T9..28 Alicron
T91528 Acron

CONSTRUCTION Nos.

SPECIFICATIONS MODEL VERSION "28"

Engine:	MAN Euro 4
Gearbox:	DC GO 210
Drive Axle:	Dana G171
Brakes:	Knorr-Bremse SN7...
Multiplex:	TV6

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EDITION 2

Table of contents

Introduction

The table of contents of the manual lists the manual chapters. For further subdivision of a chapter, see the list on the “Overview” page at the beginning of that chapter.

How to handle updating material

Please note the identification marks which, in a revised table of contents, appear behind the date mark of a chapter:

+ : additional chapter; file into your manual according to the sequence shown in the contents table.

x : chapter modified since the previous edition of the contents list; insert as a replacement of the outdated one.

Contents

This is edition 2

Chapter		Number of pages	Chapter publication date
0	Introduction	6	30 October 2007
1	Safety	4	30 October 2007
2	Identification	6	30 October 2007
3	Operation	110	9 April 2009
4	Care and maintenance	10	30 October 2007
5	Driving	46	9 April 2009
6	In case of an emergency	10	30 October 2007
7	On-the-road emergency repairs	28	30 October 2007
9	Vehicle data	14	9 April 2009
10	Alphabetical index		

Chapter 0: Introduction

Overview

Introduction

This chapter deals with the manual format and usage.

Number of pages

6

Chapter publication date

30 October 2007

Contents

Topic	See page
About this manual	0-2
Disclaim	0-3
Illustrations and symbols	0-4
Does your manual copy contain the latest additions and modifications?	0-5

About this manual

What does this manual deal with?

This manual deals with information regarding the use of the vehicle model mentioned on the title page.

Chapters

The manual is sdivided in 11 chapters (0 through 10). They are easily traceable by means of the blue card divider leaves.

Pages

Page numbering is restarted at the beginning of each chapter. All pages within a same chapter bear the same date: the chapter publication date.

Overview pages

Each chapter begins with an overview page. The overview page gives the title and the page number of each topic dealt with in the chapter.

Addenda

Behind the blue card divider leaf "Addenda", you may come across documents that, for their different type of layout or page numbering, could not be fitted into the overall structure of the manual. These are mostly instructions for use from Van Hool suppliers, presented in their original format.

How to order further copies

Copies can be ordered either from your Van Hool representative or directly from the Van Hool After Sales Department at Koningshooikt-Lier. Please mention the publication number of the manual as well as the number of copies required. The publication number is to be found in the bottom right-hand corner of the title page. If the vehicle is built to the customer's own specifications, its construction number also appears on the title page, in which case that number must be quoted too when ordering.

Disclaim

Differences from the product described

The data and illustrations in this manual are based upon the newest product information available at the time of printing. Van Hool reserve the right to make product changes without prior notice.

Inaccuracies or short-comings

Great care has been observed at writing this manual. In spite of this fact Van Hool disclaim any liability as to damage or discomfort in any sense, which could be attributed to inaccuracies or shortcomings of the manual.

Improper use of the vehicle

Van Hool disclaim any liability as to damage or accidents resulting from improper use of the vehicle. This involves: operation under circumstances or for a purpose improper to the vehicle concept, or a driving style abnormal to bus or coach operation.

Equipment modifications or equipment not supplied by Van Hool

Van Hool operating manuals do not include information on pieces of equipment not supplied by Van Hool. Nor do Van Hool amend their manuals, when the original Van Hool equipment is modified by the vehicle operating company. It is the responsibility of the operating company to provide their driving staff with the necessary additional or modified operating instructions.

Illustrations and symbols

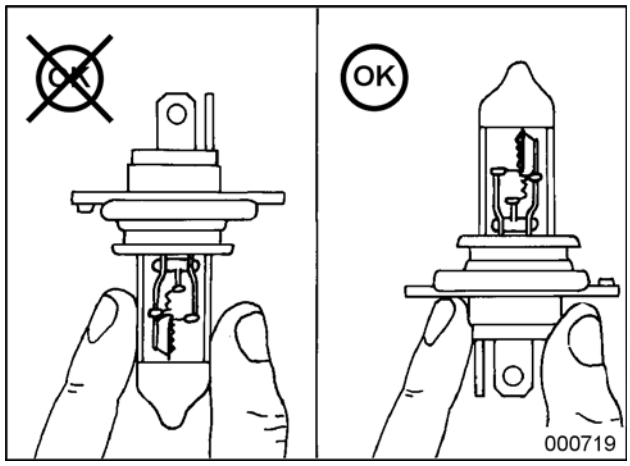
Applicability of the illustrations

Some of the illustrations in this manual are simplified or common. They will not look exactly like the component or equipment found on your vehicle. However, the procedures they illustrate do apply to your vehicle.

Symbols in illustrations

Illustrations may include symbols indicating an acceptable or a not acceptable condition or action.

Example:



Never hold halogen lamps at the bulb.

Danger symbols in the text

Certain areas of text in this manual include danger symbols.

000709	This symbol points to danger of personal injury, health or even death.
000710	This symbol points to a risk of damage to components or equipment.

Does your manual copy contain the latest additions and modifications?

To check the status of your copy	Use the table of contents at the beginning of the manual.
Is your copy complete?	Your manual is complete when all the chapters listed in the table of contents are actually present and contain the number of pages stated behind the chapter title in the table of contents.
Is your copy up-to-date?	An edition number on the first page of the manual's table of contents indicates to which edition of your manual the table of contents belongs. In order to know whether a chapter has been updated to the level of that particular edition, compare the date mark in the chapter itself with the date given behind the chapter title in the table of contents.
Method of updating	All manual holders registered in our mailing list automatically receive the additions and modifications deemed necessary by Van Hool. Updates are always supplied as complete chapters. You will recognise a modified chapter by its more recent date mark.
What does an updating package consist of?	An updating package consists of additional/replacement chapters, plus a new table of contents for the manual.

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Chapter 1: Safety

Overview

Introduction

This chapter contains recommendations to avoid injury or damage to health.

Number of pages

4

Chapter publication date

30 October 2007

Contents

Topic	See page
Safety instructions	1-2

Safety instructions

Read the manual attentively

Read this manual attentively, in both your own safety interest, that of your passengers and that of the vehicle.

Fault indications

Pay attention to indicator lamps, instruments and warning tones. Take measures, if you notice irregularities.

Mobile phones and transmitting equipment

- The use of mobile phones and transmitting equipment inside the vehicle may disturb the operation of vehicle electronics and therefore jeopardize vehicle operational safety.
- In order not to jeopardize vehicle operational safety, mobile phones and transmitting equipment must not be used inside the vehicle, unless they are connected to an external vehicle aerial.

Starting the engine

Always make sure that the parking brake has been applied and that the gearbox is in neutral, before starting the engine.

Exhaust emissions

Do not unnecessarily idle the vehicle engine. Exhaust emissions cause environmental pollution.

Do not run the engine or operate the coolant heater in a confined space, unless a proper exhaust removing system is used.

Rotating components

If you have to open the engine compartment, while the engine is running, keep at a safe distance from the rotating components.

High temperatures

- Do not touch with bare hands an engine, gearbox or retarder that has recently been operating: danger of burns.
- Never open the engine coolant system filler cap, while the coolant is hot. If this is necessary due to some obligatory reason, however, first release the pressure from the system as outlined in chapter 5 under “To check coolant level”.

Refueling

Due to fire risk refueling is allowed with the engine and the heating system switched off only (coolant heater!).

Overheated engine

Never top up the engine cooling system with cold coolant, when the engine has overheated through lack of coolant.

continued on next page

Batteries

- When disconnecting or connecting batteries, always disconnect the negative cable first and reconnect it last (so as to avoid short circuits).
- Never disconnect battery terminals, while the engine is running.
- Disconnect the battery terminals, before connecting a quick charger.
- Batteries contain a strong corrosive acid.
- Battery gas is explosive.

Electronic control units

Do not disconnect the plugs of electronic control units (ABS/ASR, EDC, gearbox etc.), unless the battery switch has been turned off.

Fuses and circuit breakers

- Always replace a blown fuse with a new one of the same current rating.
- Do not fabricate emergency bridgings by means of pieces of wire.
- If the button of an overloaded circuit breaker pops up, do not continually reset the button or hold it down.

Jacking

- Before jacking up the vehicle, make sure that the brakes have been applied and that the wheels remaining on the ground have been secured with wheel chocks.
- Use faultless and suitable jack types only, with sufficient lifting power.
- Do not jack up the chassis frame under points other than the ones indicated for this purpose. These points are indicated in the vehicle maintenance manual, chapter 1.1.

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Chapter 2: Identification

Overview

Introduction

This chapter deals with the identification.

Number of pages

6

Chapter publication date

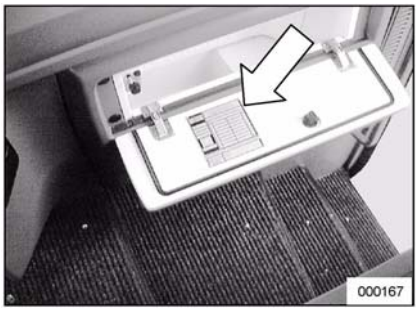
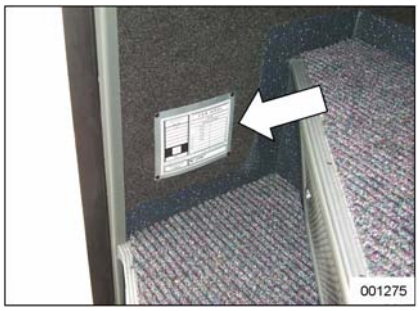
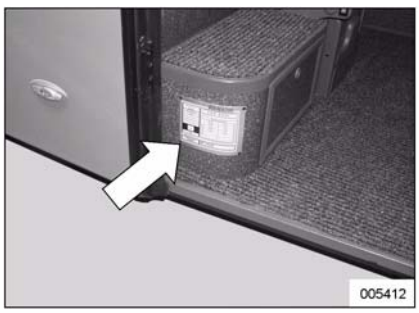
30 October 2007

Contents

Topic	See page
Vehicle identification data	2-2

Vehicle identification data

Location of vehicle identification plate

Vehicle model	Location
• T911 Alicron • T915 Acron/Alicron • T916 Alicron • T916/917 Acron • T916/917 Astron	 *Either in the glove compartment or in the refrigerator, on the right-hand side in the front entrance*
T916/917/918 Altano	 *On the left-hand side in the front entrance*
• TD924/925/927 • TD921 Altano	 *On the left-hand side in the front entrance*

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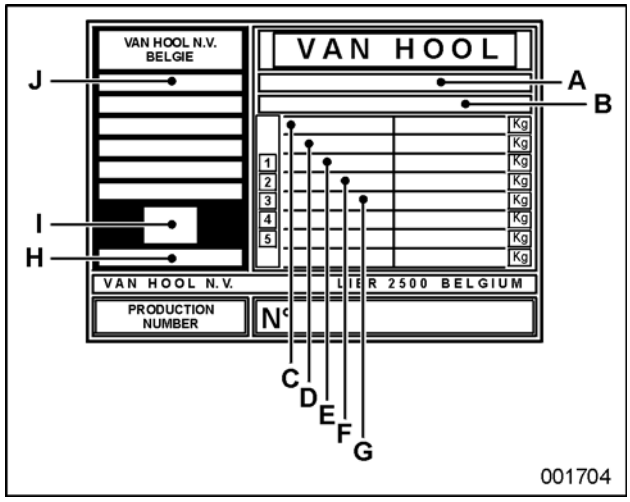
Vehicle model	Location
• T913 CL • T915 CL • T916 CL • T915 TL • T916 TL	 *On the right-hand side in the front entrance*

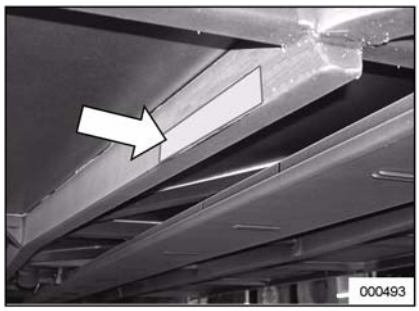
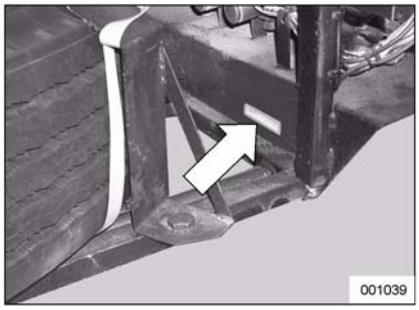
Figure: detail of vehicle identification plate



A Country compliance number (not applicable to all countries)
B Chassis number
C Gross vehicle mass
D Gross train mass (vehicle + trailer drawn)
E Gross axle mass, 1st axle
F Gross axle mass, 2nd axle
G Gross axle mass, 3rd axle
H Construction year
I Engine exhaust gas light absorption value
J Chassis type

continued on next page

Location of chassis number

Vehicle model	Location
• T911 Alicron • T915 Acron/Alicron • T916 Alicron • T916/917 Acron • T916/917 Astron • T916/917/918 Altano • TD921 Altano • T913 CL • T915 CL • T916 CL • T915 TL • T916 TL	 *Stamped on chassis side member to the rear of RH front wheel. Accessible from underside of vehicle.*
TD924/925/927	 *Stamped in the space behind the right-hand front wheel.*

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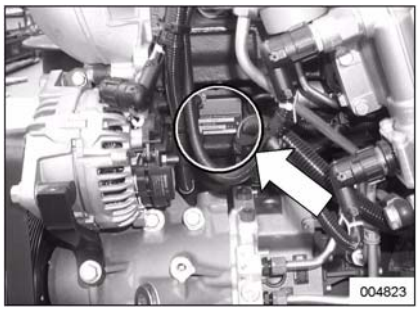
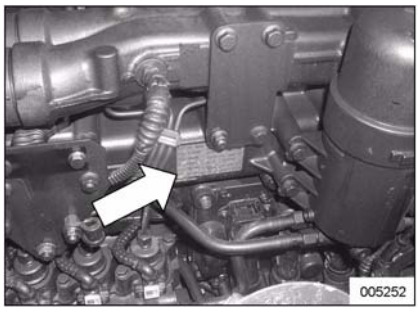
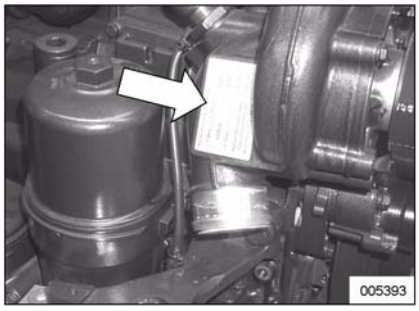
Location of engine identification plate

Engine	Location
MAN	 *On the right-hand side of the cylinder block, above the fuel-pump unit*
DAF PR	 *On the air-inlet manifold*
DAF MX	 *On the water-pump housing*

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Chapter 3: Operation

Overview

Introduction This chapter deals with the operation.

Number of pages 110

Chapter publication date 9 April 2009

Contents

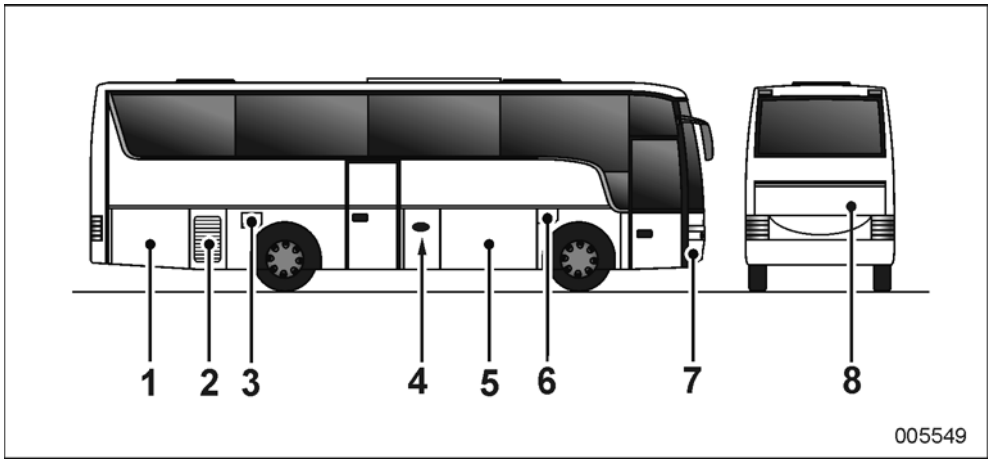
Topic	See page
Access doors and controls on outside of T911 Alicron	3-3
Access doors and controls on outside of T915 Alicron/Acron	3-9
Access doors and controls on outside of T916 Alicron	3-16
To adjust driver's seat	3-23
To adjust steering column	3-26
Electrically-operated sun blind	3-27
Driver's cab lay-out	3-28
Overview of dashboard	3-29
Overview of control console next to driver's seat	3-30
Overview of instrument panel	3-31
Central warnings on dashboard	3-32
Overview of dashboard indicator lights	3-33
Overview of multifunctional display on dashboard	3-35
Overview of switches and buttons in driver's cab	3-41
Overview of dashboard instruments	3-50
Tachograph	3-52
Interior lighting	3-53
Exterior lights and indicators	3-55
Windscreen wipers and washers	3-59
To adjust exterior mirrors	3-61
Exterior-mirror heating	3-63
Suspension raise/lower system	3-64
Electric driver's window	3-66

continued on next page

Topic	See page
Courier seat	3-67
To open/close passenger doors	3-69
To lock/unlock passenger door	3-71
Driver's door	3-73
Driver’s cab climate control system	3-74
Passenger compartment climate control	3-75
Coolant heater	3-79
To open/close power-operated luggage compartment doors	3-84
Luggage compartment doors central locking system	3-86
Roof hatches	3-88
Passenger service units	3-91
Water supply	3-94
Thetford chemical toilet	3-97
Shades Technics freshwater flush toilet	3-101
Soap dispenser	3-105
Intercom system	3-107
Blaupunkt entertainment system control	3-109

Access doors and controls on outside of T911 Alicron

Figure: right-hand side view and rear view



1 Luggage compartment, coolant heater, climate-control compressor, main shut-off valve in interior heating supply line

2 Climate-control condenser compartment, main shut-off valve in interior-heating return line

3 Not applicable

4 Rear passenger door emergency valve

5 Luggage compartment

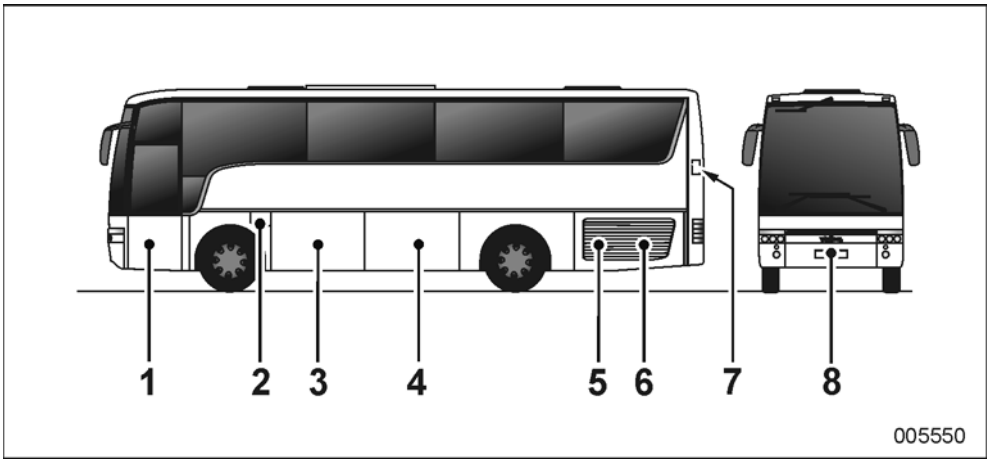
6 Fuel filler opening

7 Front passenger door emergency valve

8 Engine compartment

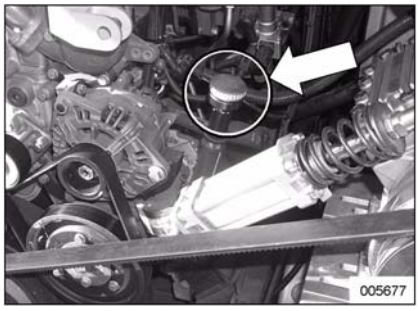
continued on next page

Figure: left-hand side view and front view



1 Driver's door (optional)
2 Fuel filler opening
3 Luggage compartment, main junction box
4 Luggage compartment, access to windscreen washer tank
5 Rear junction box
6 Air filter, air-filter restriction indicator, wheel chocks
7 Coolant filler cap
8 Spare wheel, driver's cab climate-control unit

In engine compartment

Element	Location
Coolant level sight tube	
Engine oil filler cap	

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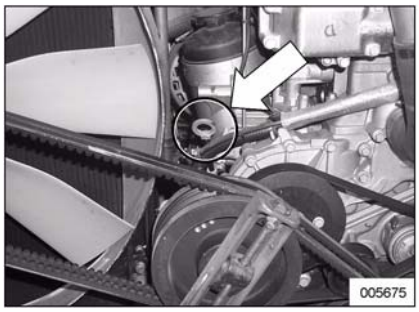
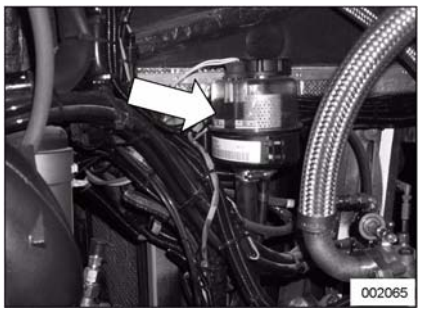
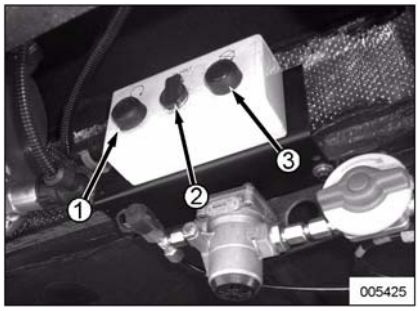
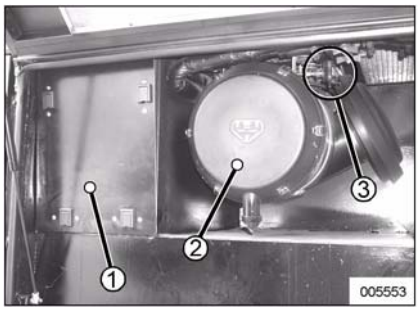
Element	Location
Engine oil dipstick	
Power steering fluid tank	
Control panel 1 Start button 2 Socket for portable lamp (24 volt) 3 Engine stop button	

Behind left-hand rear wheel

Element	Location
1 Rear junction box 2 Air filter 3 Air-filter restriction indicator	

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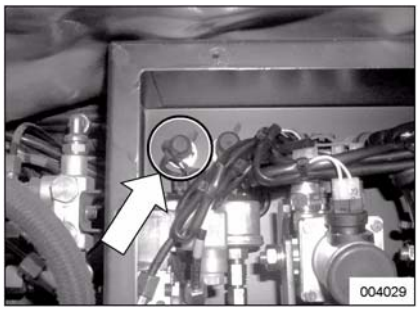
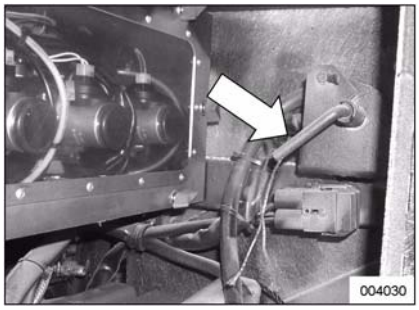
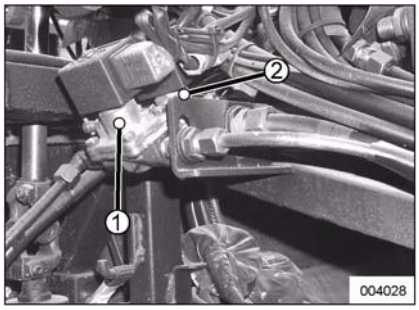
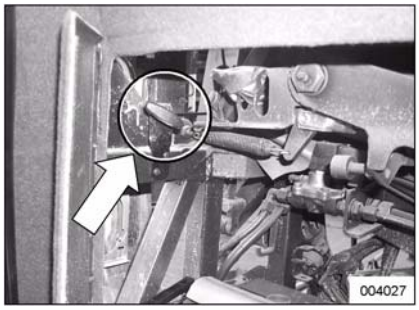
On left-hand side at very front

Element	Location
Compressed-air system fill connection	
Mechanical battery isolation switch	
1 Solenoid shut-off valve in coolant heater fuel supply line 2 Solenoid shut-off valve in engine fuel supply line	
Front bumper release knob	

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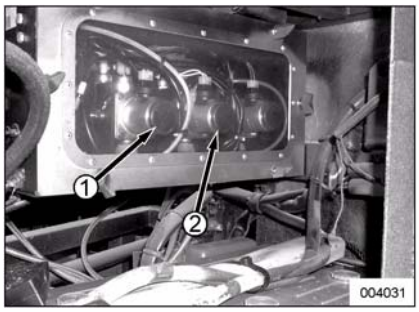
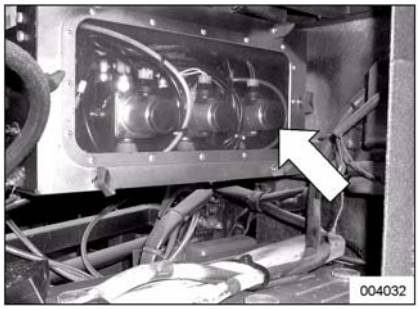
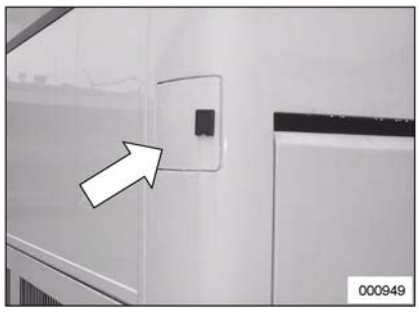
Element	Location
1 Suspension raise device control valve 2 Suspension lower device control valve	
Control valve for luggage compartments centralised locking	

On left-hand side at very rear

Element	Location
Access to coolant filler cap	

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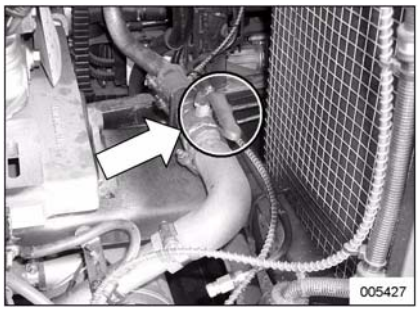
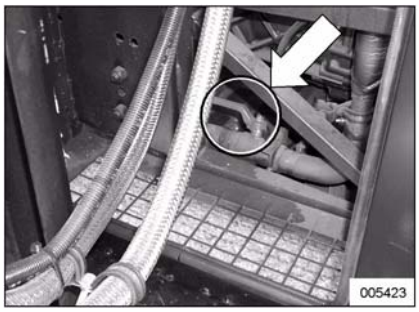
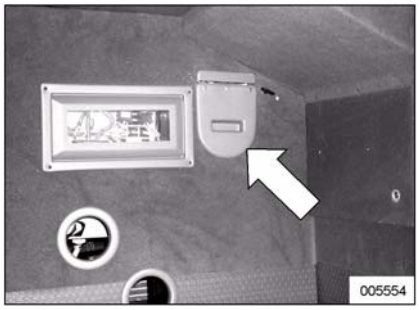
On right-hand side at very rear

Element	Location
Main shut-off valve in interior-heating supply line	

Behind right-hand rear wheel

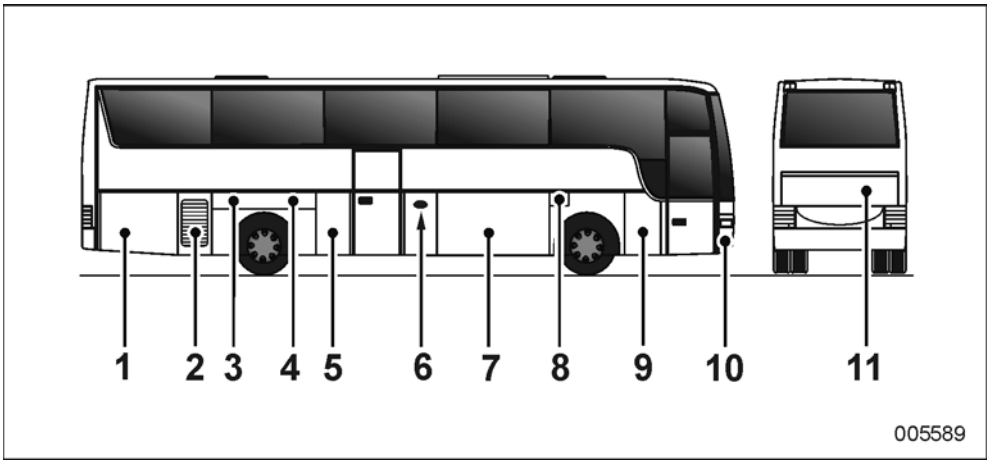
Element	Location
Main shut-off valve in interior-heating return line (behind climate-control condenser).	

Immediately ahead of rear left wheel

Element	Location
Access to windscreen washer tank filler cap	

Access doors and controls on outside of T915 Alicron/ Acron

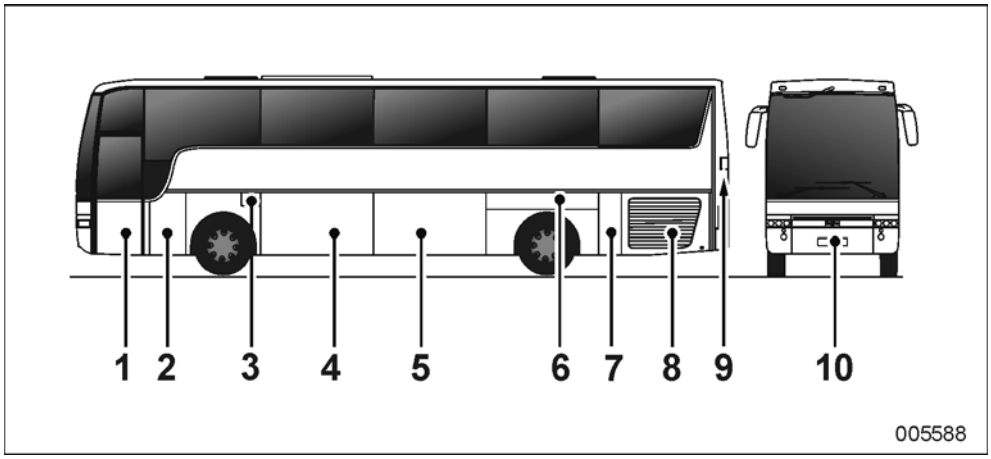
Figure: right-hand side view and rear view



1 *Coolant heater, main shut-off valve in interior heating supply line, luggage compartment*
2 *Climate-control condenser compartment, main shut-off valve in interior-heating return line*
3 *Not applicable*
4 *Only T915 Acron: luggage compartment, or tanks of fire suppression system in engine compartment*
5 *Luggage compartment, or sleeping cabin, or additional fuel tank*
6 *Rear passenger door emergency valve*
7 *Luggage compartment*
8 *Fuel filler opening*
9 *Sleeping cabin, or luggage compartment, or additional fuel tank*
10 *Front passenger door emergency valve*
11 *Engine compartment*

continued on next page

Figure: left-hand side view and front view

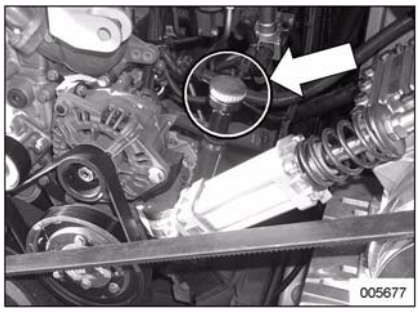
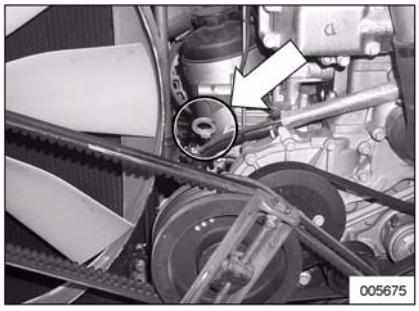
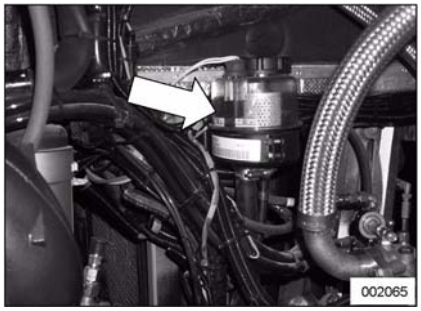
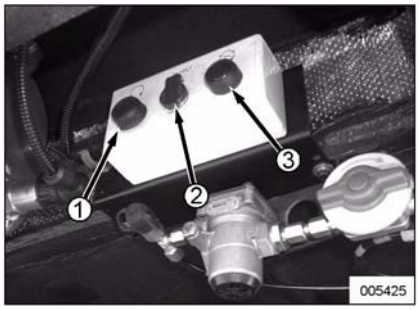


1 Driver's door (optional)
2 Sleeping cabin, or luggage compartment, or additional fuel tank; batteries
3 Fuel filler opening
4 Luggage compartment, main junction box
5 Luggage compartment
6 Only T915 Acron: luggage compartment
7 Rear junction box
8 Air filter, air-filter restriction indicator
9 Coolant filler cap
10 Spare wheel, driver's cab climate-control unit

In engine compartment

Element	Location
Coolant level sight tube	

continued on next page

Element	Location
Engine oil filler cap	
Engine oil dipstick	
Power steering fluid tank	
Control panel 1 Start button 2 Socket for portable lamp (24 volt) 3 Engine stop button	

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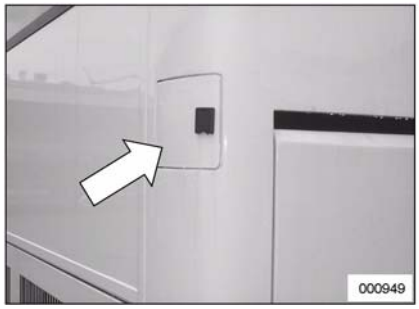
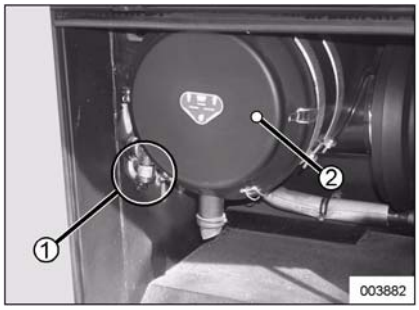
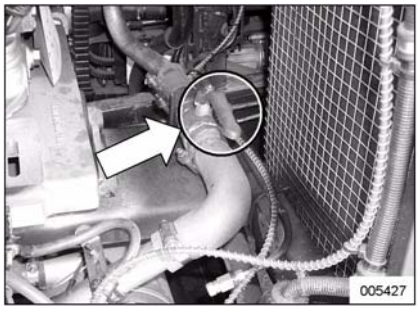
On left-hand side at very rear

Element	Location
Access to coolant filler cap	
1 Air-filter restriction indicator 2 Air filter	

On right-hand side at very rear

Element	Location
Main shut-off valve in interior-heating supply line	

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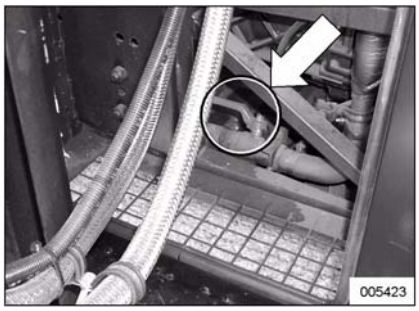
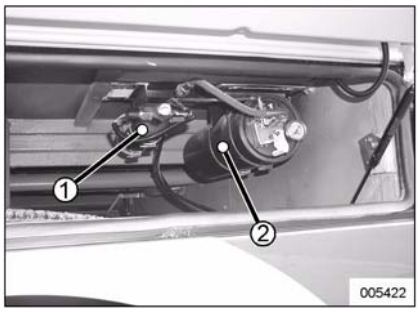
Behind right-hand rear wheel

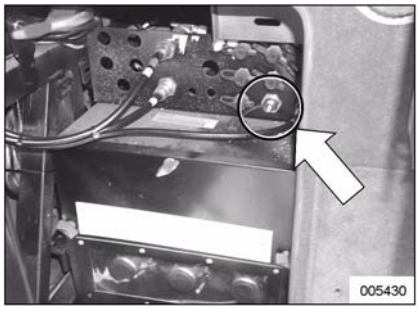
Element	Location
Main shut-off valve in interior-heating return line (behind climate-control condenser).	

Over right-hand rear wheel

Element	Location
Tanks of fire suppression system in engine compartment 1 Detection system tank (filled with nitrogen) 2 Extinguishing agent tank *NOTE: On a T915 Alicron, the tanks of the fire suppression system are located in the luggage compartment.*	

On left-hand side at very front

In vehicles having a driver's door the components mentioned below have been fitted in the riser behind the driver's door.

Element	Location
Compressed-air system fill connection	

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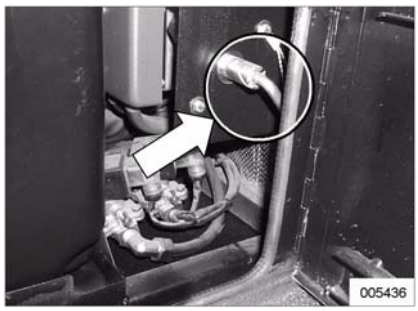
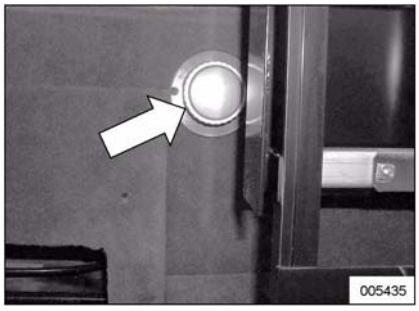
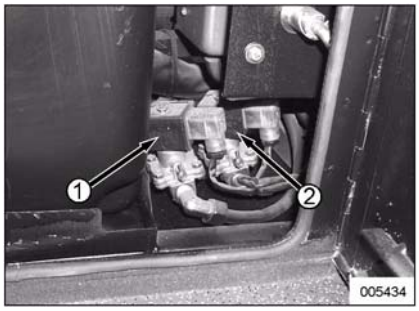
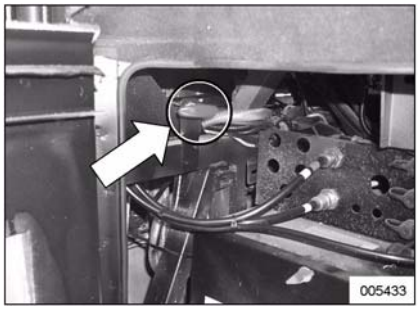
Element	Location
Mechanical battery isolation switch	
Windscreen-washer tank filler cap	
1 Solenoid shut-off valve in engine fuel supply line 2 Solenoid shut-off valve in coolant heater fuel supply line	
Front bumper release knob	

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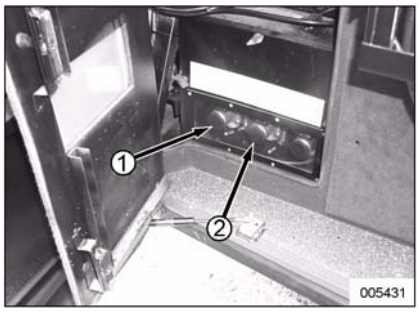
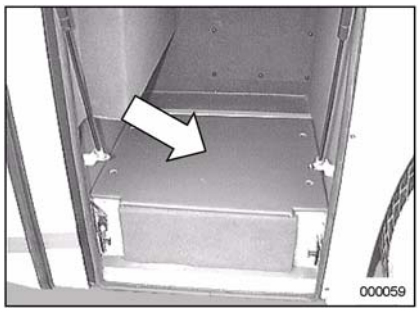
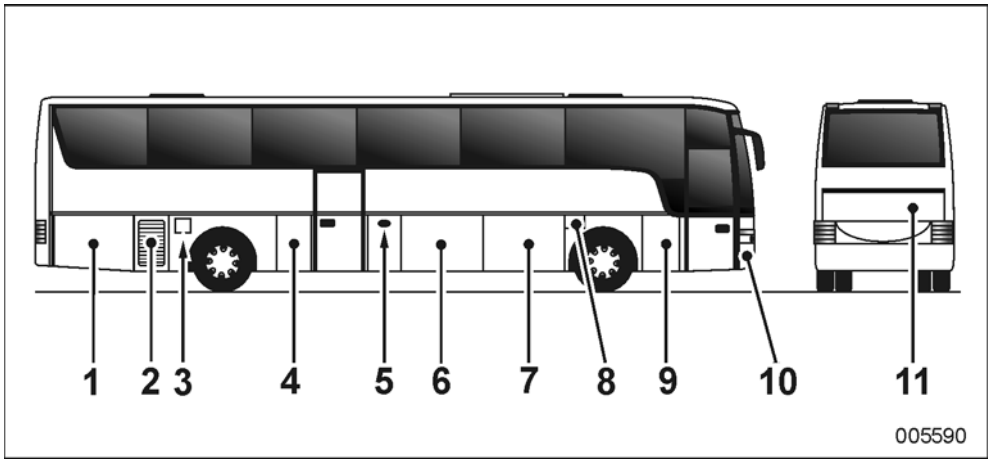
Element	Location
1 Suspension raise device control valve 2 Suspension lower device control valve	
Control valve for luggage compartments centralised locking	

Immediately ahead of left-hand front wheel

Element	Location
Battery compartment	

Access doors and controls on outside of T916 Alicron

Figure: right-hand side view and rear view



1 Coolant heater, main shut-off valve in interior heating supply line, luggage compartment
2 Climate-control condenser compartment, main shut-off valve in interior-heating return line
3 Not applicable
4 Luggage compartment, or sleeping cabin, or additional fuel tank
5 Rear passenger door emergency valve
6 Luggage compartment
7 Luggage compartment
8 Fuel filler opening
9 Sleeping cabin, or luggage compartment, or additional fuel tank
10 Front passenger door emergency valve
11 Engine compartment

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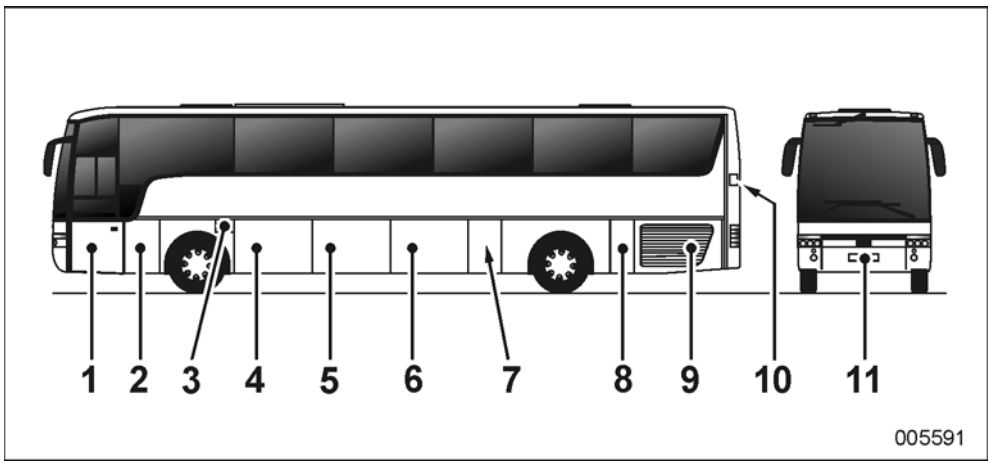
Figure: left-hand side view and front view

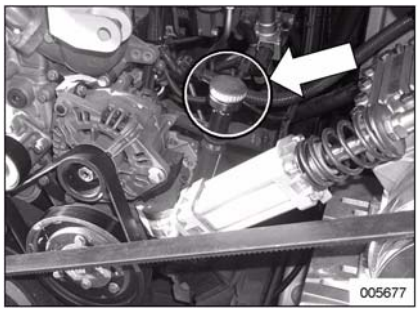
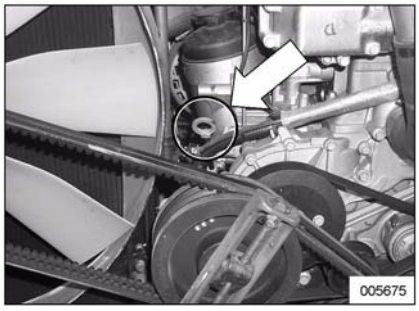
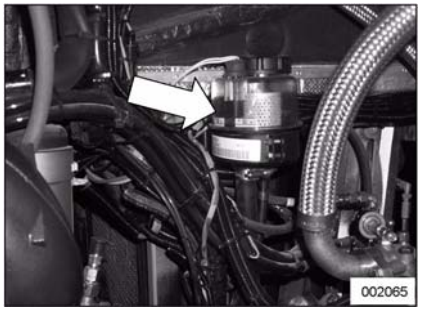
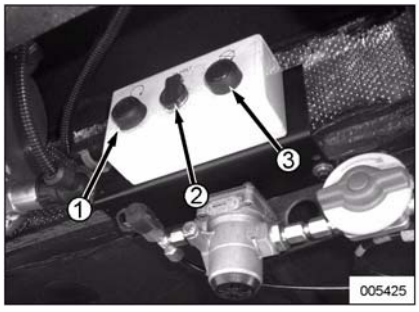


1 Driver's door (optional)
2 Sleeping cabin, or luggage compartment, or additional fuel tank; batteries
3 Fuel filler opening
4 Luggage compartment, main junction box
5 Luggage compartment
6 Luggage compartment
7 Luggage compartment
8 Rear junction box
9 Air filter, air-filter restriction indicator
10 Coolant filler cap
11 Spare wheel, driver's cab climate-control unit

In engine compartment

Element	Location
Coolant level sight tube	

continued on next page

Element	Location
Engine oil filler cap	
Engine oil dipstick	
Power steering fluid tank	
Control panel 1 Start button 2 Socket for portable lamp (24 volt) 3 Engine stop button	

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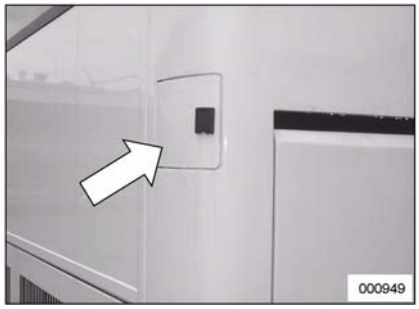
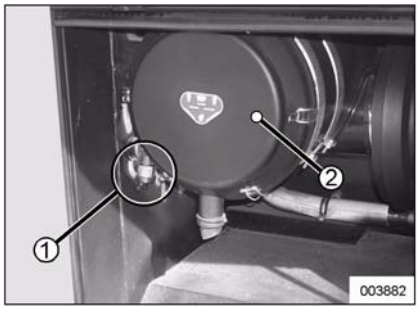
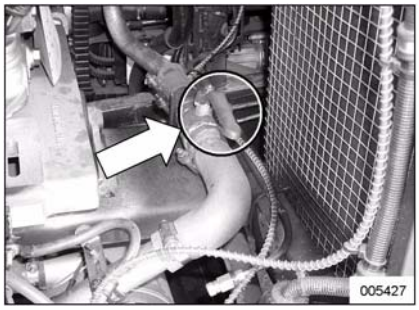
On left-hand side at very rear

Element	Location
Access to coolant filler cap	
1 Air-filter restriction indicator 2 Air filter	

On right-hand side at very rear

Element	Location
Main shut-off valve in interior-heating supply line	

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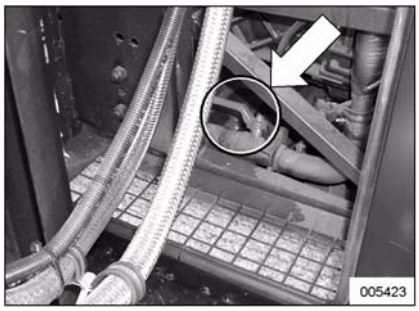
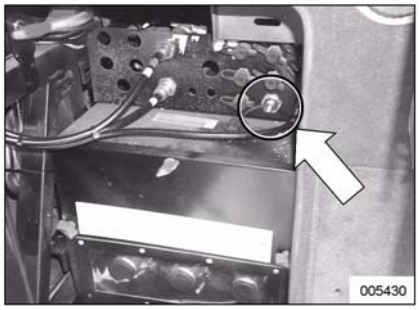
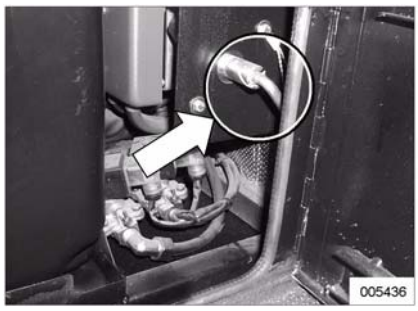
Behind right-hand rear wheel

Element	Location
Main shut-off valve in interior-heating return line (behind climate-control condenser).	

On left-hand side at very front

In vehicles having a driver's door the components mentioned below have been fitted in the riser behind the driver's door.

Element	Location
Compressed-air system fill connection	
Mechanical battery isolation switch	

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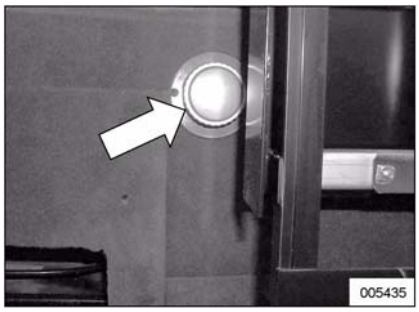
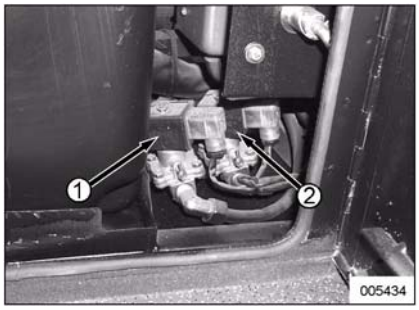
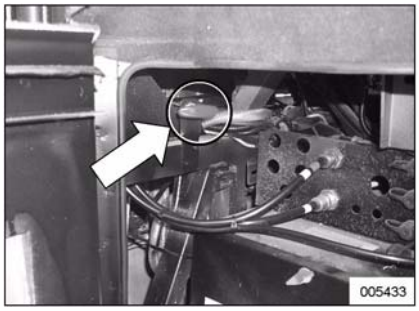
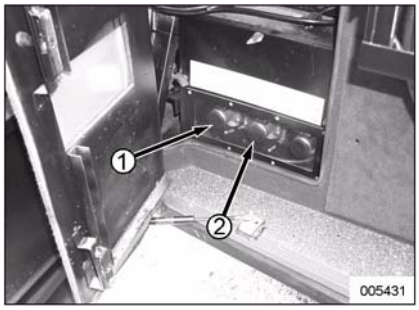
Element	Location
Windscreen-washer tank filler cap	
1 Solenoid shut-off valve in engine fuel supply line 2 Solenoid shut-off valve in coolant heater fuel supply line	
Front bumper release knob	
1 Suspension raise device control valve 2 Suspension lower device control valve	

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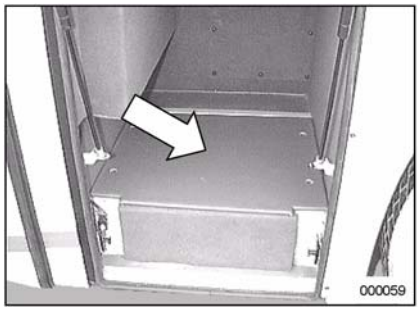
Element	Location
Control valve for luggage compartments centralised locking	

Immediately ahead of left-hand front wheel

Element	Location
Battery compartment	

To adjust driver's seat

Introduction

The driver's seat has been equipped with air suspension and a three-point safety belt.

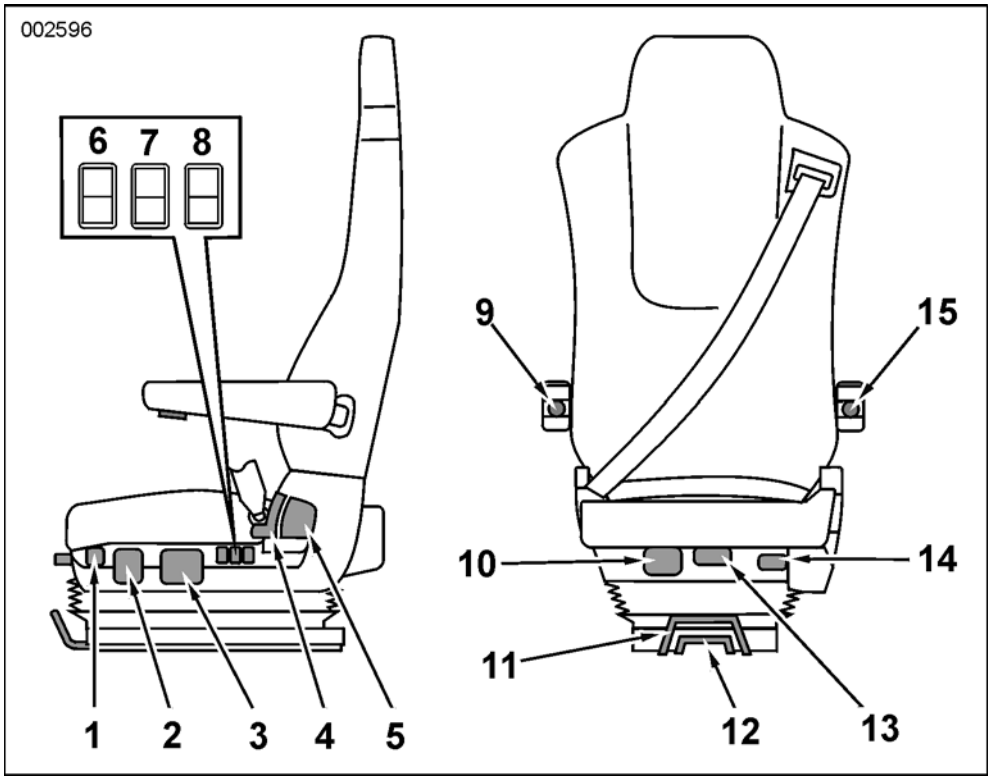
WARNING!

Never adjust seat while driving.

Adjusting possibilities

The figure may show more possibilities than your vehicle offers.

Figure: driver's seat



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Procedure

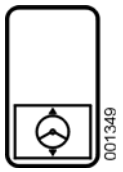
Function	Controls	Action
Moving the seat to the lowest or set seat height	1	• Lowest seat height: push the knob down. • Set seat height: lift the knob up.
To adjust air suspension	**2**	• Harder: lift the knob up. • Softer: push the knob down.
To adjust seat height	**3**	• Higher: lift the knob up. • Lower: push the knob down.
To adjust shoulder area tilt	4	Pull handle upwards, press shoulder area into desired position and release handle to lock.
To adjust the seat back angle	**5**	Pull handle upwards, press seat back into desired position and release handle to lock.
To adjust volume of lumbar support lower part	**6**	• To inflate: press in the upper section of the switch. • To deflate: press in the lower section of the switch.
To adjust volume of lumbar support upper part	**7**	• To inflate: press in the upper section of the switch. • To deflate: press in the lower section of the switch.
To adjust volume of side bolsters	8	• To inflate: press in the upper section of the switch. • To deflate: press in the lower section of the switch.
To adjust the height of the right-hand arm rest	**9**	Turn the knob.

continued on next page

Function	Controls	Action
To tilt the seat	**10**	Lift the handle up, tilt the seat to the desired position, then release the handle to lock.
To move the whole seat forwards or backwards	**11**	Lift the handle up, slide the seat into the desired position, then release the handle to lock.
To move the seat to its rear position (rest portion)	**12**	Lift handles 11 and 12 simultaneously, slide the seat to the rear position, then release the handle to lock. *NOTE: Do not drive with the seat in this position.*
To move the seat cushion forwards and backwards	**13**	Lift the handle up, push the seat to the desired position, then release the handle to lock.
To switch the horizontal suspension on or off.	14	• Off: push the knob to the left. • On: push the knob to the right.
To adjust the height of the right-hand arm rest	**15**	Turn the knob.

To adjust steering column

Dashboard switch

Switch	Function
	To unlock steering column

Procedure

Both the height and the angle of the steering wheel are adjustable.

Step	Action
1	Briefly press the unlock switch.
2	Place steering wheel in the desired position. After approximately 5 seconds the steering column will be relocked. *NOTE: The pneumatic lock-release will only operate when there is sufficient pressure in the auxiliaries tank and the master switch is on.*

Safety system

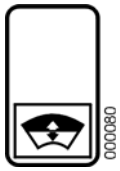
A built-in safety system ensures that you can only adjust the steering column when the vehicle is stationary.

Electrically-operated sun blind

Introduction

A sun blind has been installed behind the windscreen.

Dashboard switch

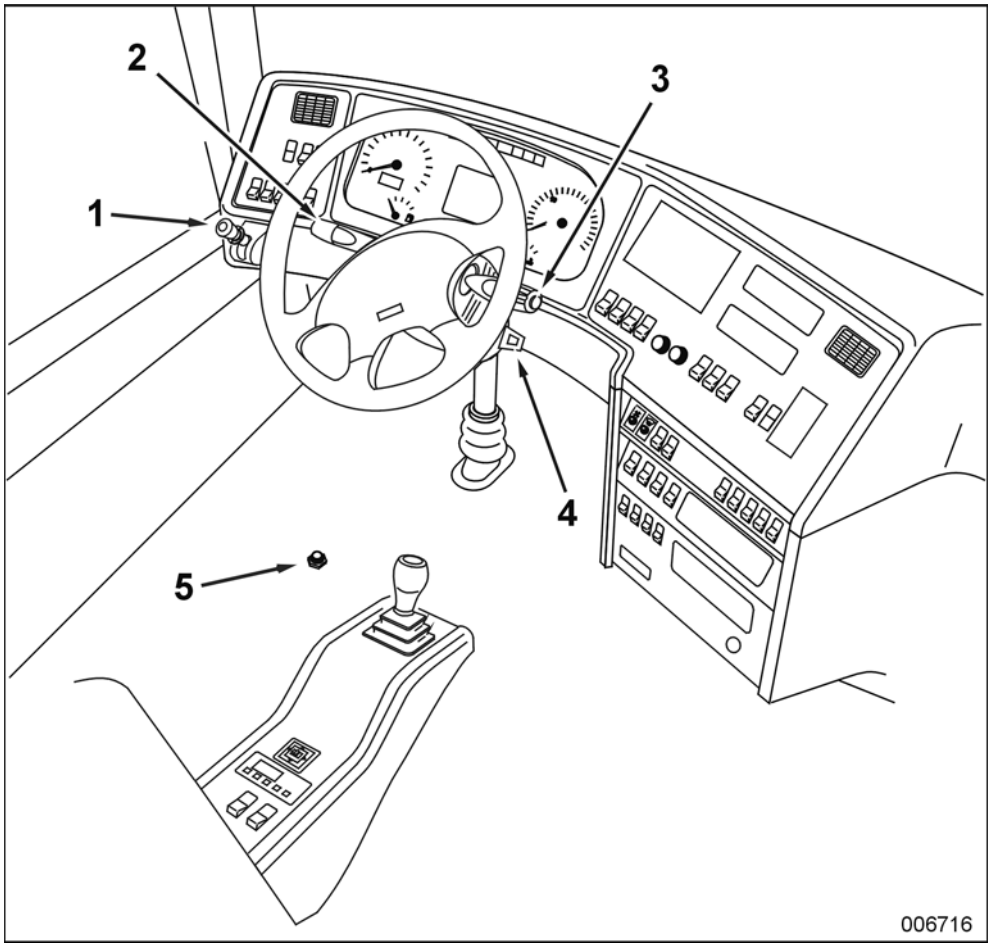
Switch	Function
	To roll up or down electrically operated sun blind

To lower/roll up a blind

To ... the blind...	press...
roll up	upper part of dashboard switch.
lower	lower part of dashboard switch.

Driver's cab lay-out

Figure:
Driver's cab



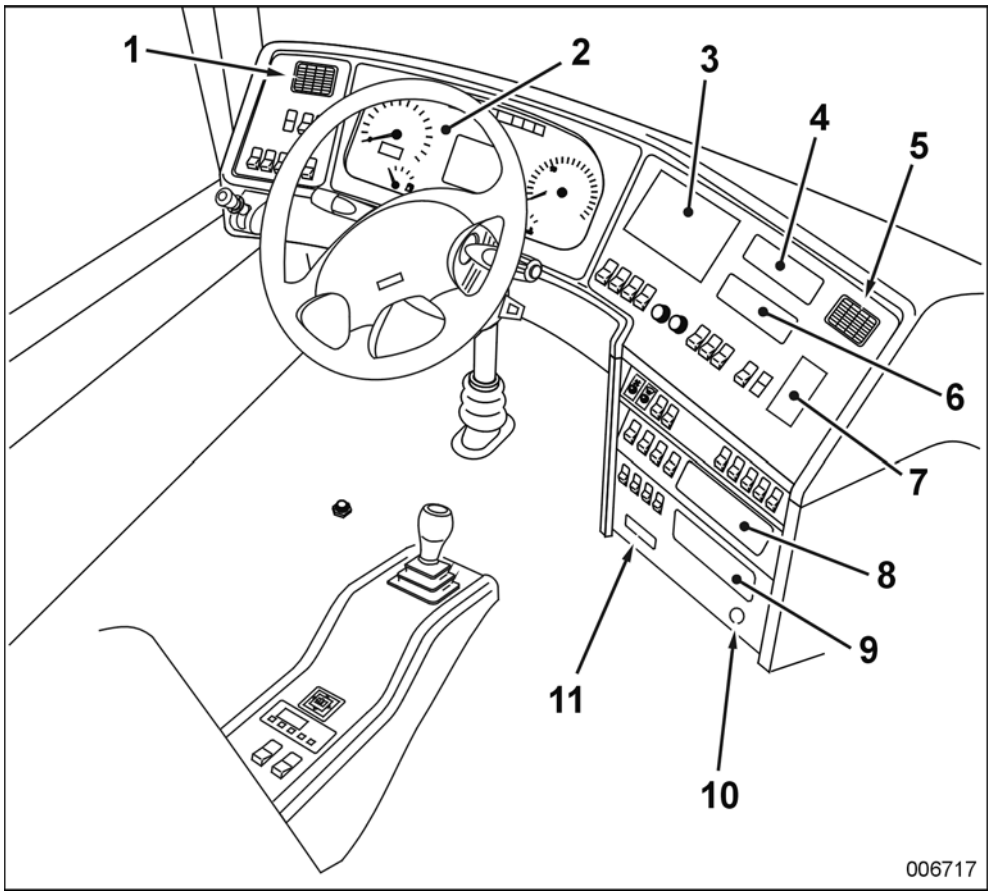
1 Parking brake lever
2 LH combination switch
3 RH combination switch
4 Ignition switch
5 Parking-brake emergency release knob

Overview of dashboard

Items not shown

You will find details of the items not shown in the dashboard figure elsewhere in this manual.

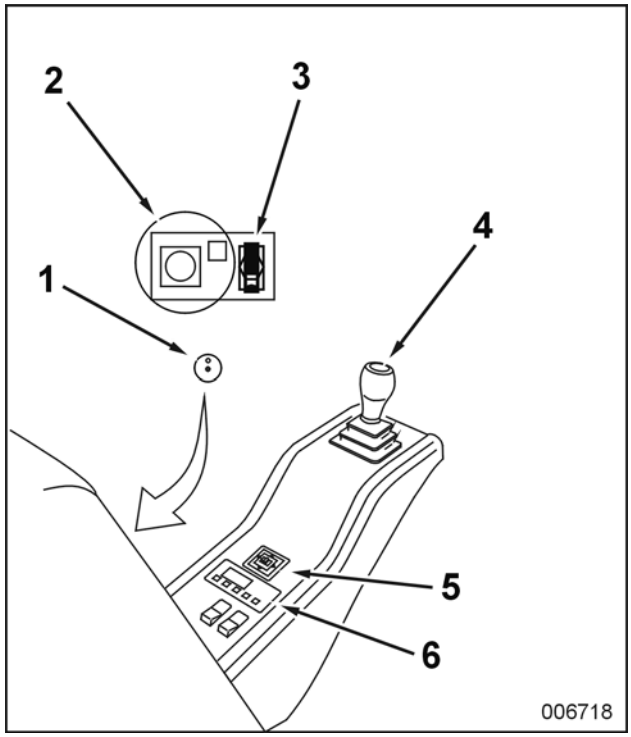
Figure: Dashboard



1 Adjustable air vent
2 Instrument panel
3 Multimedia screen
4 Audio screen with DVD/CD player
5 Adjustable air vent
6 Audio/video control panel
7 Mobile phone support for handsfree operation
8 Tachograph
9 Navigation system
10 24V socket
11 OBD diagnostics socket

Overview of control console next to driver's seat

Figure: control console



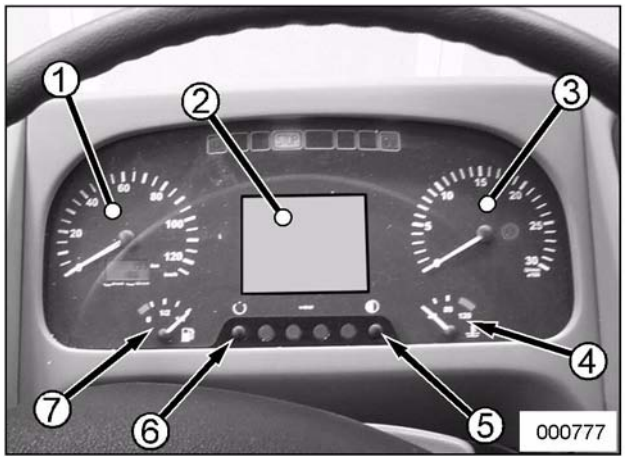
1 Indicator light and switch of anti-theft alarm installation
2 Components for diagnostics
3 Central emergency switch
4 Gearlever
5 Exterior mirrors control knob
6 Coolant heater control panel

Overview of instrument panel

Items not shown

You will find the items not shown in the dashboard illustration elsewhere in this manual.

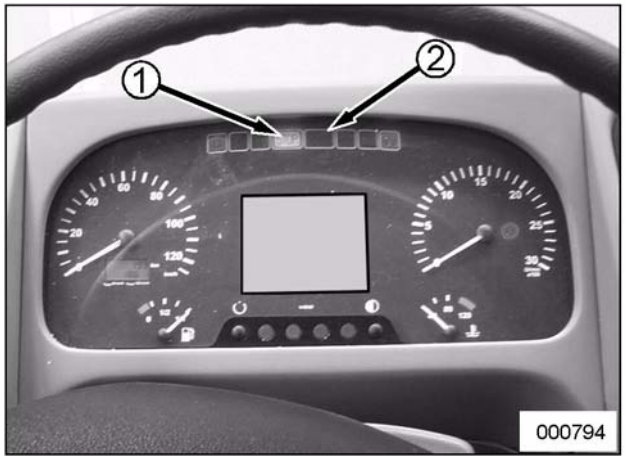
Figure: instrument panel



1 Speedometer/odometer
2 Multifunctional display
3 Revolution counter
4 Coolant temperature gauge
5 Dashboard lighting dimmer
6 Multifunctional display menu-button
7 Fuel gauge

Central warnings on dashboard

Figure: central warning lights on dashboard



1 Red central warning light
2 Yellow central warning light

Central warning lights: function

Central warning light	comes on, when ...	Action required
Red	a serious fault has occurred in a particular vehicle function.	Stop as quickly as possible and switch the engine off, unless "System failure" displays. Note what the multifunctional display says is wrong and contact maintenance personnel for help.
Yellow	a less serious fault has occurred in a particular vehicle function.	Note what the multifunctional display says is wrong. Report to maintenance personnel at the end of your run.

Warning tone

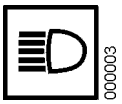
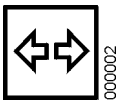
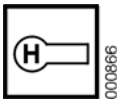
You will hear a warning tone if the red or yellow light comes on.

Overview of dashboard indicator lights

Introduction

Why lights come on and how to proceed has been explained elsewhere in this manual.

Indicator lights

Light	Colour	Message
	Red	Parking brake or bus-stop brake is on
	Blue	Main beam on
	Green	Direction indicator on
	Red	Central warning
	Yellow	Central warning
	Green	All passenger doors closed
	Yellow	Stop requested
	Red	Passenger door open
	Green	Courier call

continued on next page

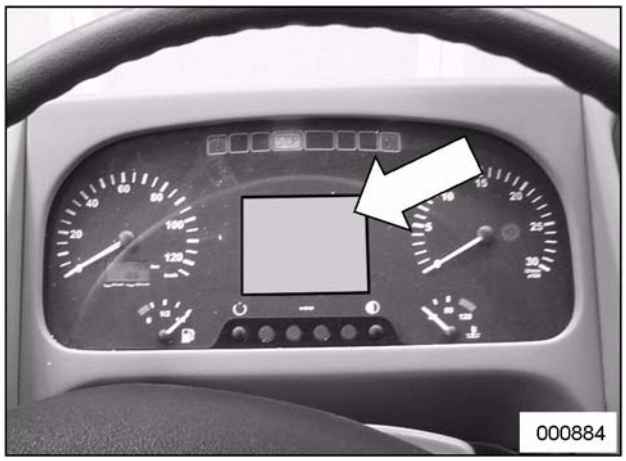
Overview of multifunctional display on dashboard

Introduction

If all vehicle systems are working properly, there will be no error messages on the display while you are driving.

How to proceed when an error message does appear on the multifunctional display is explained elsewhere in this manual.

Figure: Multi-functional display



Background of the multifunctional display

If exterior lighting is...	the multifunctional display background is ...
off	light
on	dark

Messages on multifunctional display

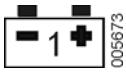
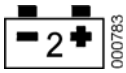
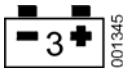
NOTE: Of the symbols below, only those which Van Hool has programmed for your particular vehicle will appear on the display.

Symbol	Message
	• Large: engine oil pressure too low • Small: faulty engine oil pressure sensor
	DAF engine: engine oil-level sensor faulty

continued on next page

Symbol	Message
+ yellow central warning light	DAF engine: engine oil level has reached topping-up level, or oil level too high
+ red central warning light	DAF engine: engine oil level too low
	• Large: coolant temperature too high • Small: faulty coolant temperature sensor
	Temperature in engine compartment or coolant heater compartment too high
	Pressure in a compressed-air tank too low
	Only vehicles with "Mobil Elektronik" steered trailing axle: • MAN engine: level in fluid tank of "Mobil Elektronik" steered trailing axle too low • DAF engine: level in steering system fluid tank too low
	Suspension raise or lower system activated
	Coolant level too low
	Fault in EDC engine control system

continued on next page

Symbol	Message
	Automatic gearbox: oil temperature too high
	Automatic gearbox: overheating of oil
	CAN bus fault
	Retarder operating
	Fault in ABS or ASR system
	ASR system operating
	Fault in No. 1 alternator
	Fault in No. 2 alternator
	Fault in No. 3 alternator
	Tank fuel level low
	Brake pads worn
	Luggage compartment doors centrally locked

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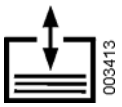
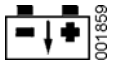
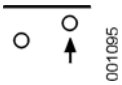
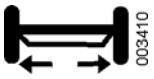
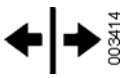
Symbol	Message
	Engine compartment door open
	Coolant heater burner operating
	Passenger emergency call
	• Water tank for sanitary equipment almost empty or... • waste water tank almost full
	On-board voltage too low
	Clutch pedal pressed for over 4 seconds
	Trailing axle load reduction
	Trailing axle steering failure
	• T9.. Altano: passenger compartment windscreen heating switched on • TD.. Astromega: upper deck windscreen-heating switched on
	Ski-box/luggage trailer direction indicators flashing
	Manual gearbox
	Manual gearbox: lower range engaged

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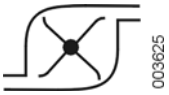
Symbol	Message
	Engine turbo-pressure sensor faulty
	Climate control temperature sensor faulty
	Passenger compartment climate-control system set for inside air recirculation
	Passenger compartment climate-control system set for dehumidifying
	Courier call
	Fault in tachograph
	Climate control: pressure in refrigerant circuit too often too high
	Climate control: pressure in refrigerant circuit too often too low
	MAN engine: fault in FFR on-board computer
	DAF engine: low AdBlue level
	• DAF engine: exhaust gas emission standard no longer guaranteed • MAN engine: failure in exhaust gas aftertreatment system

continued on next page

Symbol	Message
	DAF engine: failure in exhaust gas aftertreatment system *NOTE: EAS is short for "Exhaust Aftertreatment System".*
	Speed limiter switched on
	Over-current detected in electrical system
+	Wheelchair user has announced himself

Overview of switches and buttons in driver's cab

Introduction

The use of the switches and buttons is explained elsewhere in this manual.

Exterior lighting

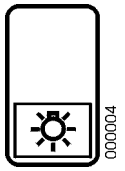
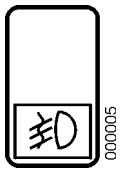
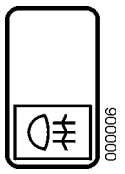
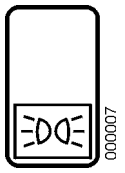
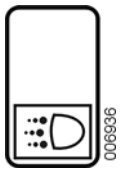
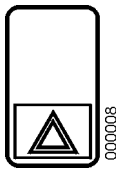
Figure	Function
	To switch exterior lighting on/off
	To switch front fog lamps on/off
	To switch rear fog lamps on/off
	To switch end-outline marker lamps on/off (option)
	To switch off daytime running lights
	To switch hazard warning signal (red) on/off

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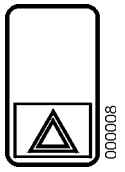
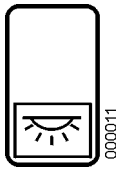
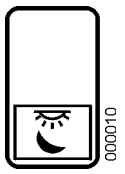
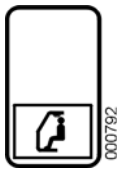
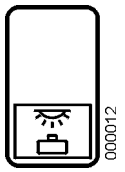
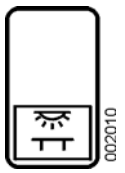
Figure	Function
	To switch school sign illumination (orange) on/off

Interior lighting

Figure	Function
	To switch passenger compartment lighting on/off *NOTE: On a TD9.., there is one switch for the lower and one for the upper deck.*
	To switch passenger compartment night lighting on/off *NOTE: On a TD9.. , there is one switch for the lower and one for the upper deck.*
	To switch driver's cab lighting on/off
	To switch courier lighting on/off
	To switch luggage compartment lighting on/off
	To switch on/off the kitchen-lighting electrical circuit (option)

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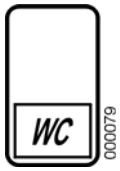
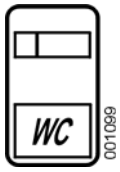
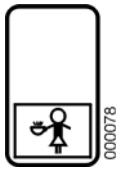
Sanitary facilities

Figure	Function
	To switch on/off water supply or toilet compartment electrical circuit
	To open dump valve of toilet waste water tank (option)
	To switch on/off electrical circuit for boiler or crew call system

Climate control

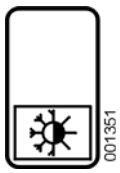
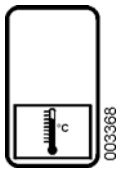
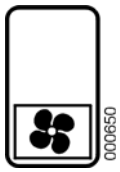
Figure	Function
	Passenger compartment: to switch climate control on/ off
	Passenger compartment: to set temperature *NOTE: On a TD9.., there is one switch for the lower and one for the upper deck.*
	Passenger compartment: to set air-flow rate *NOTE: On a TD9.., there is one switch for the lower and one for the upper deck.*

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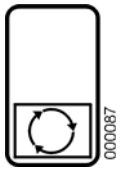
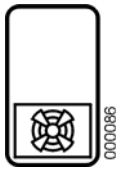
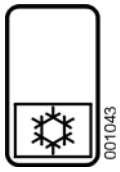
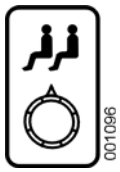
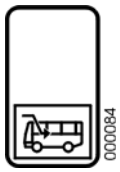
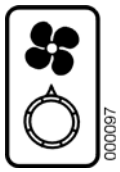
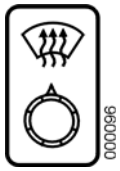
Figure	Function
	Passenger compartment: to select inside/outside air
	Passenger compartment: to switch extractor fans on/off
	Passenger compartment: inside air dehumidification (momentary-on type switch)
	• T9.. Altano: to raise temperature at the front of the passenger compartment • TD9.. : to raise temperature at the front of the upper deck
	To operate electric roof hatch
	Driver's cab: to set fan speed
	Driver's cab: to set temperature

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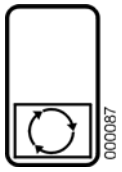
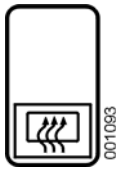
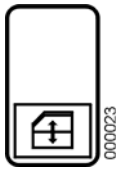
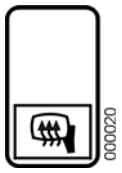
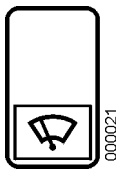
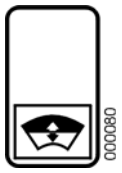
Figure	Function
	Driver's cab: to select inside/outside air

Windows and mirrors

Figure	Function
	• T9.. Altano: to switch passenger compartment windscreen heating on/off • TD9.. : to switch upper windscreen heating on/off *NOTE: Momentarily press the switch to activate the system. After 30 minutes, the system will be switched off automatically. If you want to switch off the system sooner than that, press the switch a second time.*
	• To open/close electrically operated driver's window • To open/close electrically operated courier window (option)
	To switch outside mirror heating on/off *NOTE: The driver's window heating and, if present, the courier window heating work simultaneously with the exterior rearview mirror heating.*
	To switch on/off upper windscreen wiper
	To roll up or down electrically operated sun blind

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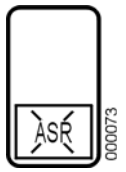
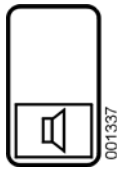
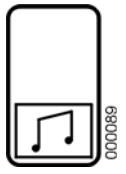
ABS/ASR system

Figure	Function
	To perform ABS/ASR system diagnosis
	To reduce effectiveness of ASR system

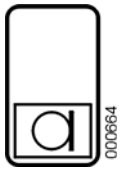
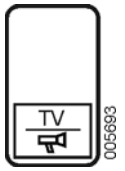
Passenger doors

Figure	Function
	To open/close front passenger door
	To open/close rear passenger door

Audio/video

Figure	Function
	To switch off loudspeaker in driver's cab
	To switch on/off wireless microphone electrical circuit

continued on next page

Figure	Function
	To switch on/off the driver's microphone
	Panorama camera image selection on monitors in passenger compartment

Other

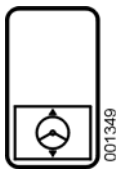
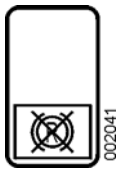
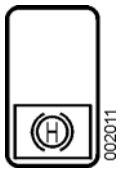
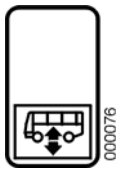
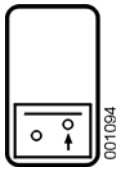
Figure	Function
	To unlock steering column
	To disconnect retarder foot-control
	To apply/release bus-stop brake (only vehicles for Germany)
	To raise/lower suspension from normal ride height
	To reduce trailing-axle load

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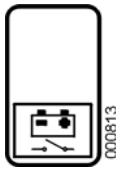
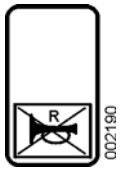
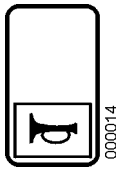
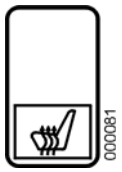
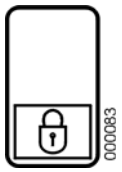
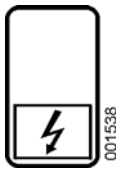
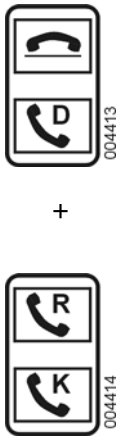
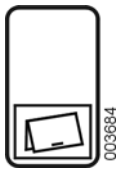
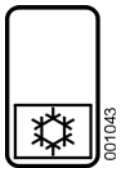
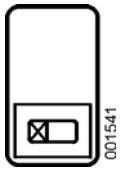
Figure	Function
	To connect/isolate batteries
	To switch off reversing bleeper
	To select electric horn or air horn
	To switch driver's seat heating on/off
	To lock luggage compartment with centralised system
	To switch on/off 220V electrical circuit
	To switch intercom system on/off (in the case of one telephone)

continued on next page

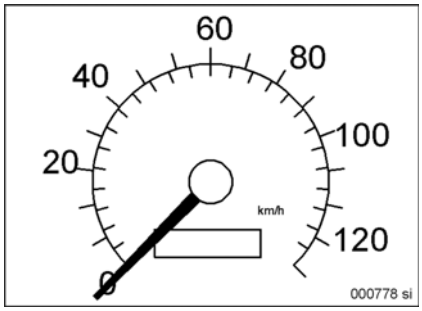
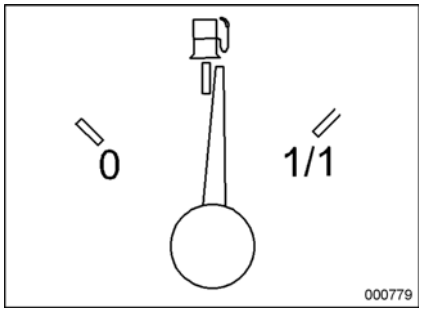
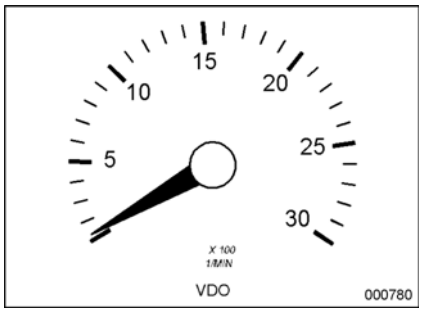
Figure	Function
	To switch intercom system on/off (in the case of two or three telephones)
	To open/close power-operated luggage compartment doors
	To switch on/off refrigerator(s) electrical circuit
	To switch on/off lighting of destination signs or interior displays

Overview of dashboard instruments

Introduction

You will find more details on each instrument elsewhere in this manual.

Instruments

Instrument	Function
	Speedometer
	Fuel gauge
	Revolution counter

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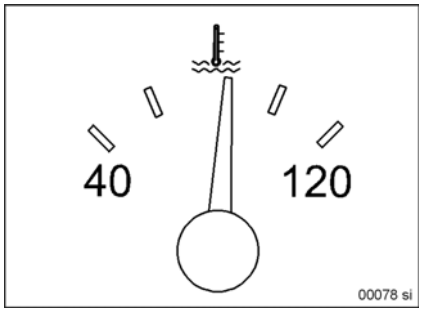
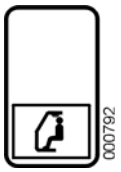
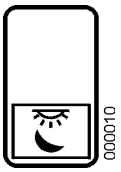
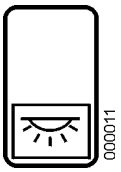
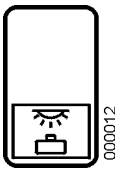
Instrument	Function
	Coolant temperature gauge

Tachograph

Tachograph location	Refer to “Dashboard lay-out”.
More information	Refer to operation manual by tachograph manufacturer. This manual is supplied separately with the new vehicle.

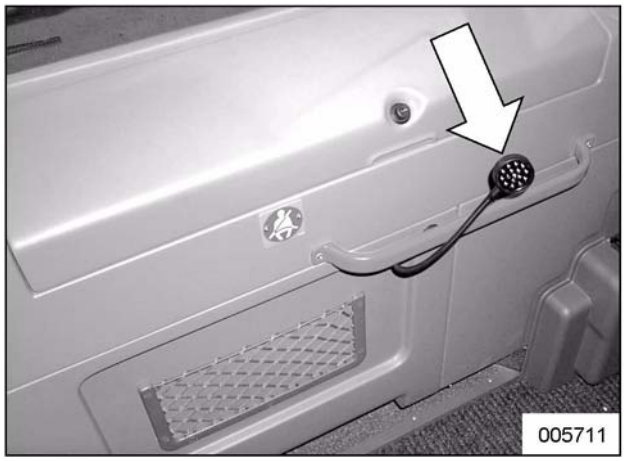
Interior lighting

Dashboard switches

Switch	Function
	To switch driver's cab lighting on/off
	To switch courier lighting on/off
	To switch passenger compartment night lighting on/off • Position 0: off • Position 1: night lighting • Position 2: night lighting + electrical circuit for reading lights switched on *NOTE: With the switch in position 2 passengers can switch on and off their reading lights by themselves by pressing a push-button on the service unit above their heads.* *NOTE: On a TD9.. Astromega, there is one switch for the lower and one for the upper deck.*
	To switch passenger compartment lighting on/off • Position 0: off • Position 1: gangway lighting • Position 2: reading lights *NOTE: On a TD9.., there is one switch for the lower and one for the upper deck.*
	To switch luggage compartment lighting on/off

continued on next page

Figure: courier reading light



The picture shows a set-up on a TD9.. Astromega.

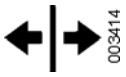
To switch on courier reading light

Hold a finger in front of the central red LED to switch the reading light on.

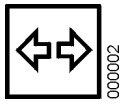
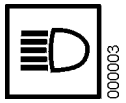
NOTE: Switch off the reading light in the same way.

Exterior lights and indicators

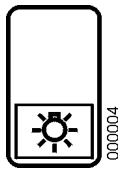
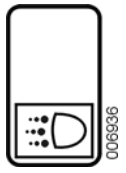
Message on multifunctional display

Symbol	Message
	Ski-box/luggage trailer direction indicators Flashes together with the direction indicator lamps of the ski-box/luggage trailer. Does not function, if an energised direction indicator lamp fails.

Dashboard indicator lights

Light	Message
	Vehicle direction indicators (green). Flashes together with the direction indicators of the vehicle. Does not function, if an energised direction indicator lamp fails.
	Main beam (blue) Illuminates, when main beam is selected or when you flash main beam.

Dashboard switches

Switch	Function
	To switch exterior lighting on/off • Position 0: off • Position 1: position lights on • Position 2: headlamps (dipped or main beam) on *NOTE: The headlamps can only operate with running engine.* *NOTE: Use the steering column combination switch to switch from dipped to main beam and vice versa*. *NOTE: The colour of the multifunctional display changes when the exterior lighting is switched on*.
	To switch off daytime running lights

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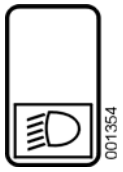
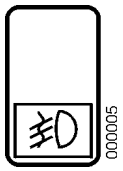
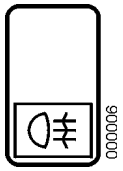
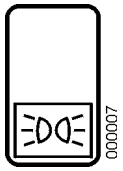
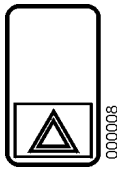
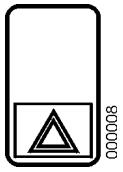
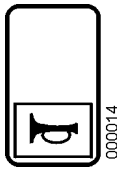
Switch	Function
	To switch xenon main beam (option) on/off You can switch on the xenon main beam, only with the halogen main-beam headlamps on. *NOTE: This switch will no longer be installed as from the 2008 model.*
	To switch front fog lamps on/off
	To switch rear fog lamps on/off
	To switch end-outline marker lamps on/off (option)
	To switch hazard warning signal on/off (red)
	To switch school sign illumination on/off (orange)
	To select electric horn or air horn • Position 0: electric horn • Position 1: air horn

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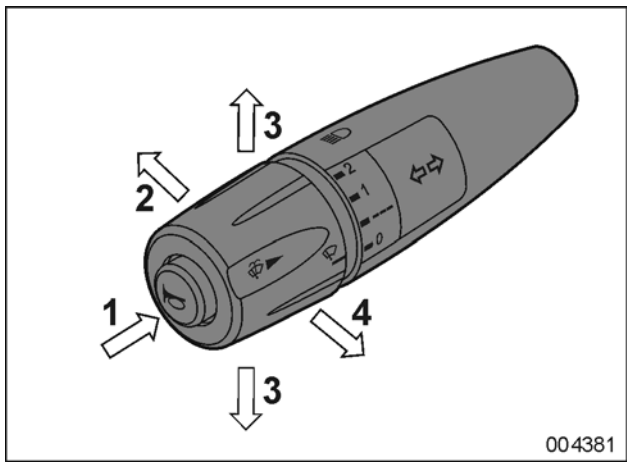
Figure: LH combination switch on steering column



1 Horn
2 Main/dipped beam selection
3 Direction indicators
4 Main beam flashing

Hazard warning signal

Hazard warning signal means all the direction indicators flash simultaneously. Use it to warn others when your vehicle presents a danger on the road. You can switch on the system at all times.

Fog lamps

The front fog lamps are switched on by means of a separate switch on the dashboard. They can only operate if the ignition is on and the exterior lighting switch is in position 1 or 2.

Cornering lights

Cornering lights provide additional lighting of the front corners of the vehicle. The electrical circuit of the cornering lights is automatically switched on if the exterior lighting switch is in position 2 and vehicle speed is less than 40 km/h.

On your vehicle, the front fog lamps, if not switched on, act as cornering lights.

When do the front fog lamps act as cornering lights?

If you...	**then ...**
switch on the LH direction indicators	the LH front fog lamp comes on.
switch on the RH direction indicators	the RH front fog lamp comes on.
put the transmission in reverse	both front fog lamps come on.

continued on next page

Rear fog lamps

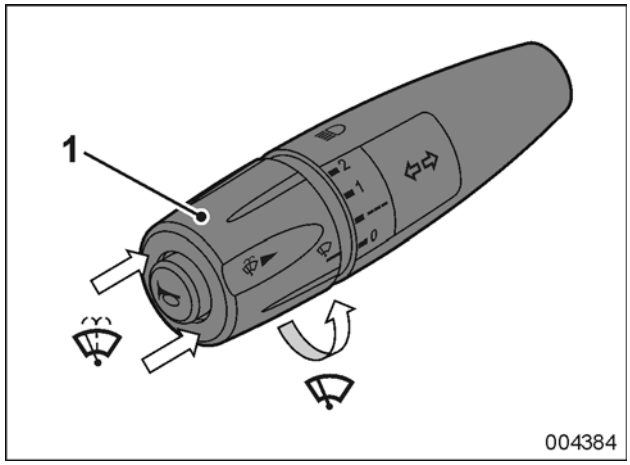
The rear fog lights are switched on by means of a separate switch on the dashboard. They can only operate if the front fog lamps are on or if the exterior lighting switch is in position 2.

Daytime running lights

The daytime running lights come on as soon as the vehicle ignition is on. They can be switched off by means of a separate switch on the dashboard.

Windscreen wipers and washers

Figure: LH combination switch on steering column



1 Rotary switch

CAUTION!

To avoid damaging the wiper blades, do not operate the wipers on a dry windscreen. First detach frozen wiper blades from the windscreen before switching the wipers on.

To cut in lower windscreen wipers

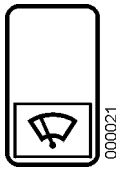
Turn switch (1) of the combination switch at the LH side of the steering column to the desired position.

Wiping positions of combination switch

Symbol	Function
0	Off
------	Intermittent wiping
1	Slow wiping
2	Fast wiping

continued on next page

Dashboard switch

Switch	Function
	To switch on/off upper windscreen wiper

To cut in upper windscreen wiper

Press the wiper switch on the dashboard to cut in the upper windscreen wiper.

To cut in windscreen washers

Press switch (1) of the combination switch at the LH side on the steering column to activate the lower washers.

NOTE: The upper washer functions simultaneously with the other washers, provided the dashswitch of the upper windscreen wiper has been pressed.

Headlamp washers

These operate simultaneously with the windscreen washers.

Location of windscreen washer tank

See under "Access doors and controls on outside".

To adjust exterior mirrors

Introduction

The mirror casing houses two separate mirrors. Only the vertical mirror is electrically adjustable with a knob in the driver's cab.

The remote control only works with the batteries connected and the ignition on.

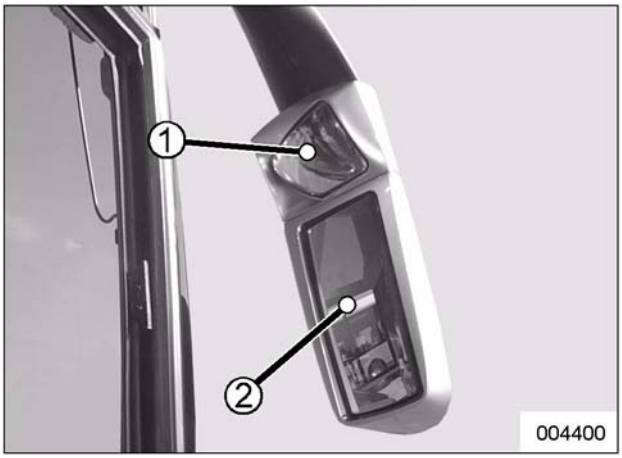
CAUTION!

The vertical mirror cannot be adjusted manually.

CAUTION!

The mirror arm cannot be folded up against the body wall.

Figure: right-hand exterior mirror



1 Wide-angle mirror
2 Vertical mirror

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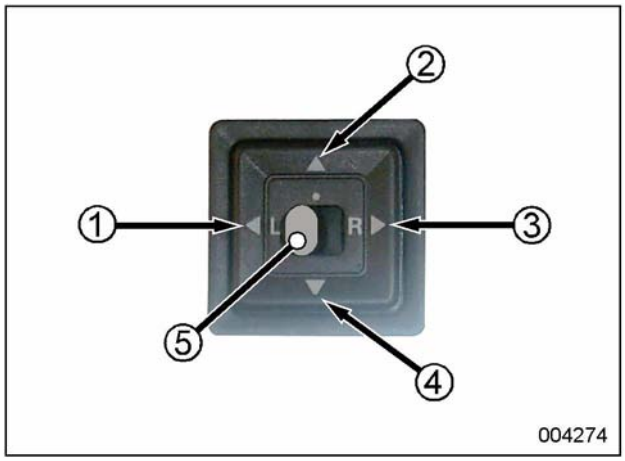
Figure: exterior mirror control knob



To select mirror

If you have to...	then slide switch (5) to...
adjust left-hand mirror	the left.
adjust right-hand mirror	the right.

To adjust mirror

To turn mirror...	press edge... of control knob.
upwards,	2
downwards,	4
to the left,	1
to the right,	3

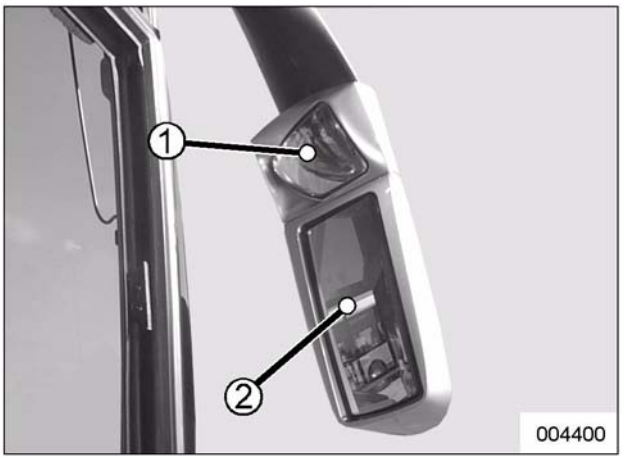
Exterior-mirror heating

Introduction

Both exterior mirrors have been equipped with a heating system to prevent condensation.

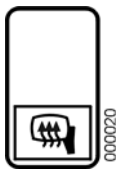
The heating only works with the batteries connected and the ignition on.

Figure: right-hand exterior mirror



1 Wide-angle mirror
2 Vertical mirror

Dashboard switch

Switch	Function
	Exterior-mirror heating

Suspension raise/lower system

Introduction

There is a switch on the dashboard that allows you to raise or lower the suspension compared to the normal riding height. The raise/lower system enables you to negotiate a difficult passage or to get across a ramp.

NOTE: Switching on the raise/lower system is only possible with engine running.

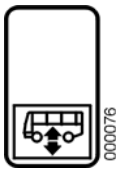
CAUTION!

Do not drive faster than walking pace with the suspension in raised/ lowered position, and only over a short distance.

Message on multifunctional display

Symbol	Message
	Vehicle suspension raised or lowered

Dashboard switch

Switch	Function
	Raising or lowering from normal ride position

To raise from ride position

To...	press...
raise	upper part of switch momentarily.
return to normal ride height	lower part of switch again.

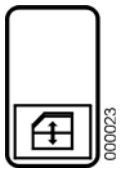
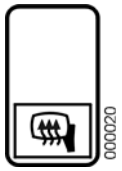
continued on next page

To lower from ride position

To...	press...
lower	lower part of switch momentarily. *NOTE: On vehicles with elevator for disables persons at the rear, the lowering system only operates on the front axle.*
return to normal ride height	lower part of switch again.

Electric driver's window

Dashboard switches

Switch	Function
	To open/close electrically operated driver's window
	To switch outside mirror heating on/off

To open/close driver's window

To... window	press...
open	lower part of dashboard switch.
close	upper part of dashboard switch.

Driver's window heating

The driver's window heating system is switched on and off by means of the rearview-mirror heating switch.

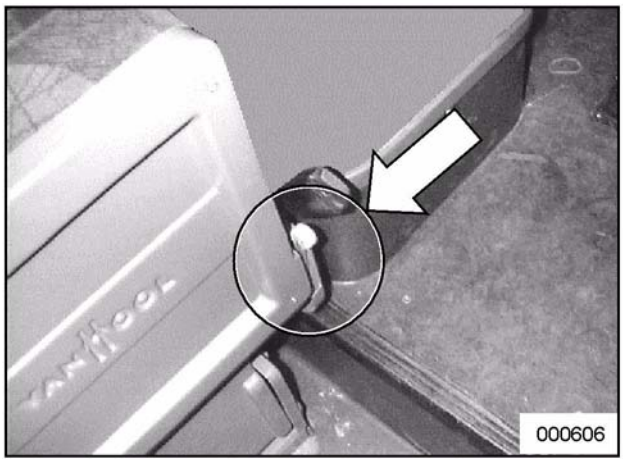
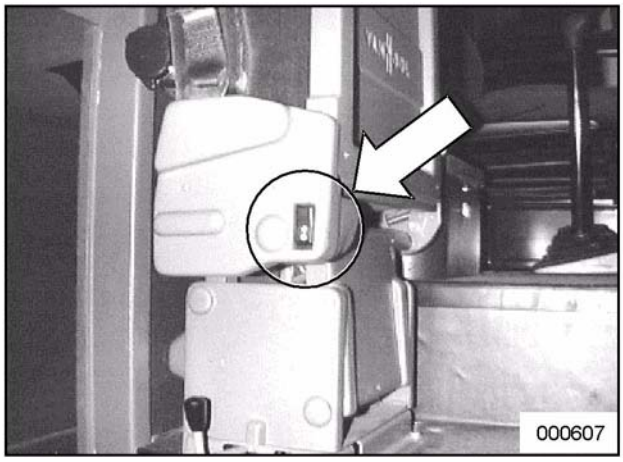
The heating only works with the batteries connected and the ignition on.

Courier seat

Location of courier seat

The electrically adjustable courier seat is located at the vehicle front.

To adjust seat

Step	Action
1	Press the handle downwards and sit on the seat. 
2	• Press in the top section of the switch: seat slides forwards automatically. The back support tilts at the same time. • Press in the bottom section of the switch: seat slides backwards again. 

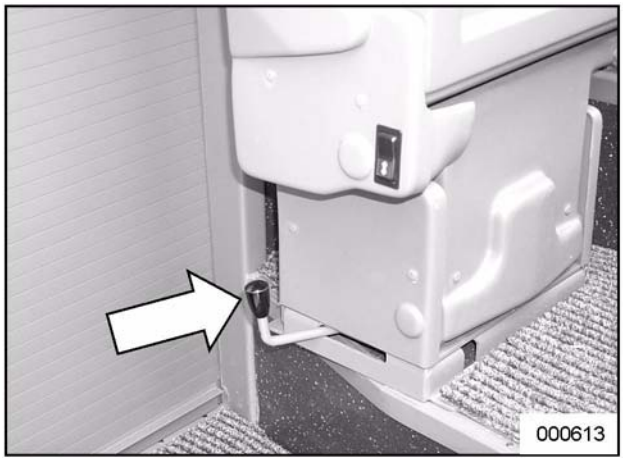
continued on next page

To fold up seat cushion

When the seat cushion is being folded up, the seat automatically slides backwards as far as possible.

To fold away courier seat

You can fold away the courier seat in order to facilitate access to the driver's sleeping cabin.

Step	Action
1	Pull the handle at the base of the seat forward. 
2	Turn the seat a quarter turn around its vertical axis.

To revolve back courier seat

After having revolved back the seat, check whether it has been locked properly.

To open/close passenger doors

Dashboard indicator lights

Light	Colour	Message
	Green	Passenger doors closed
	Red	Passenger door open

Dashboard push-buttons

Push-button	Function
	To open/close front passenger door
	To open/close rear passenger door

Minimum air pressure

The minimum air pressure in the auxiliary equipment tank should be at least 3 bar, before the passenger doors can be opened/closed in the normal manner.

WARNING!

Always apply the parking brake, before having passengers embark/disembark.

Conditions

Dashboard push-button of ...	operates, only if...
front passenger door	the door has been unlocked.

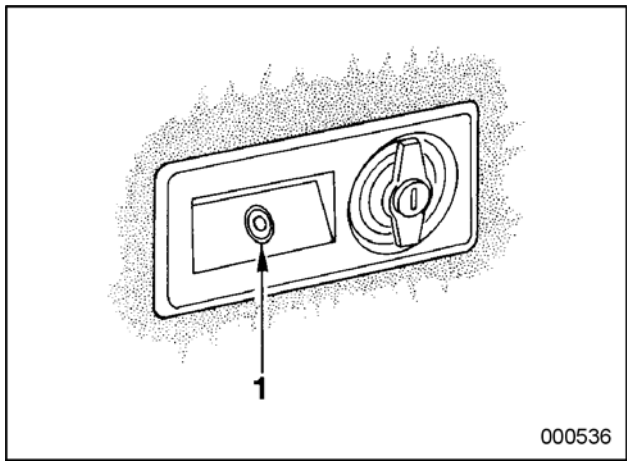
continued on next page

Dashboard push-button of ...	operates, only if...
rear passenger door	• the door has not been locked and... • the battery master switch is on.

To open/close passenger door with dashboard push-button

To... door,	press ...
open	dashboard button once.
close	same button once more.

Figure: control panel on front passenger door



1 Push-button to open/close the door from the outside

To open/close door from outside

Provided it has not been locked, you can open the front passenger door using the push-button on the control panel on the door.

Press again to close the door.

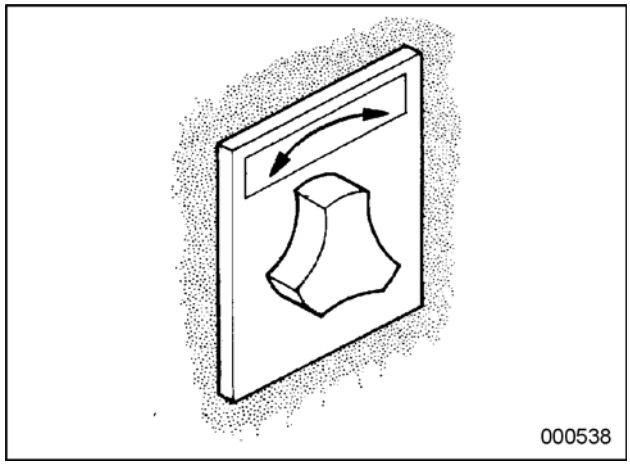
NOTE: The rear passenger door can not be opened/closed from the outside.

Automatic reopening

The automatic reversing system is an anti-entrapment safety device. The door re-opens automatically, when a person or an object prevents it from closing completely. It will then remain open, until you close it by means of the push-button.

To lock/unlock passenger door

Figure: rotary knob on the inside



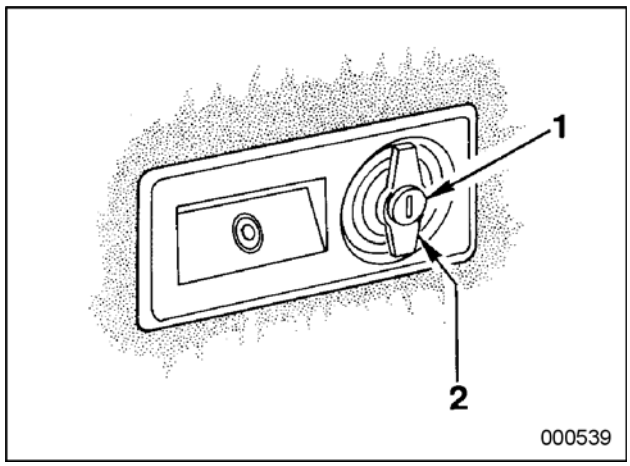
To lock door from the inside

Turn knob by a quarter of a turn clockwise.

To unlock door from the inside

Turn knob by a quarter of a turn counterclockwise.

Figure: door control on the outside



1 Lock
2 Rotary handle to lock/unlock

continued on next page

To lock door from the outside

Step	Action
1	Push key into lock and turn it clockwise by a quarter of a turn. *NOTE: You cannot remove key from lock in this position.*
2	Turn handle counterclockwise by a quarter of a turn.
3	Turn key by a quarter of a turn counterclockwise and remove from lock. Door is locked now.

To unlock door from the outside

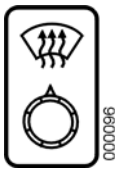
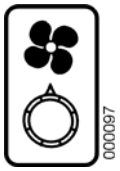
Step	Action
1	Push key into lock and turn it clockwise by a quarter of a turn.
2	Turn handle clockwise by a quarter of a turn.
3	Turn key by a quarter of a turn counterclockwise and remove from lock. Door is unlocked again.

Driver's door

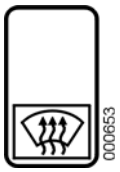
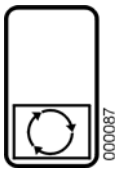
To open	To open the unlocked door, press the lock cylinder.
To lock/unlock	To lock or unlock the driver's door, turn the key by a quarter turn counter-clockwise or clockwise in the lock respectively.

Driver’s cab climate control system

Rotary knobs

Rotary knob	Function
	Temperature setting
	Fan speed setting (on vehicles with driver’s cab cooling)

Switches

Switch	Function
	Fan speed selection (on vehicles without driver’s cab cooling) • Position 1: off • Position 2: low speed • Position 3: high speed
	Inside/outside air selection • Position 1: outside air • Position 2: inside air

Inside or outside air?

Under normal operating conditions, it is best to choose outside air.

It is recommended to select inside air if:

- fast cab or windscreen heating is required;
- outside temperature is extremely low;
- outside air is unbreathable, for example because of high concentration of exhaust fumes.

Passenger compartment climate control

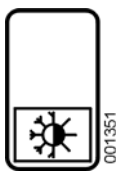
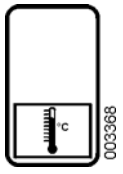
Introduction

The passenger compartment climate control system is fully automatic. However, when necessary, you can override the automatic system by using the dashboard switches.

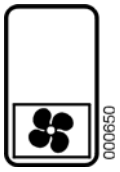
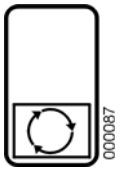
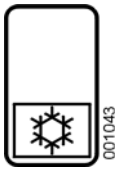
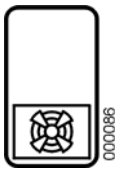
Messages on multifunctional display

Symbol	Message
	Passenger compartment climate-control system set for inside air recirculation
	Dehumidification of passenger compartment inside air
	Pressure in refrigerant circuit too often too high. You can continue driving. Keep in mind that the climate control does not work or does not perform optimally. In any case, report to maintenance personnel as soon as you get back to the garage.
	Pressure in refrigerant circuit too often too low. You can continue driving. Keep in mind that the climate control does not work or does not perform optimally. In any case, report to maintenance personnel as soon as you get back to the garage.

Dashboard switches

Switch	Function
	To switch climate control on/off
	To set temperature

continued on next page

Switch	Function
	To set air-flow rate
	To select inside air
	To dehumidify inside air
	To switch rear extractor fans on

To switch on the climate control

Momentarily press the lower part of the "Climate control on/off" switch.

NOTE: The climate control only works with running engine.

To switch off climate control system

Momentarily press the upper part of the "Climate control on/off" switch.

System positions

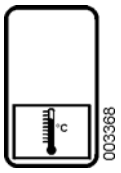
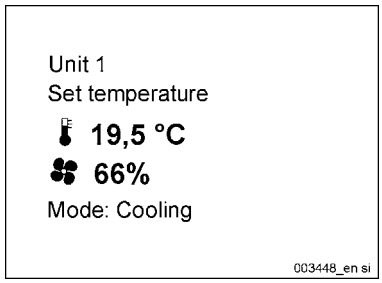
Three positions are possible:

- off;
- automatic;
- manual.

To set temperature

You can set the temperature at any value between 16 and 30 °C.

continued on next page

Step	Action	Result
1	Momentarily press the switch below.  	The menu below appears on the multifunctional display. 
2	• To raise the temperature: press the upper part of the same switch. • To lower the temperature: press the lower part of the same switch.	On the display, the set temperature changes.

Inside or outside air

The system itself chooses between inside and outside air. If, for example because of high concentration of exhaust fumes, the outside air is unbreathable, you can opt for inside-air recirculation.

Momentarily press the lower part of the "Inside air recirculation" switch. The symbol "Passenger compartment climate control set for inside air recirculation" appears on the multifunctional display.

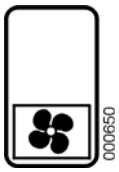
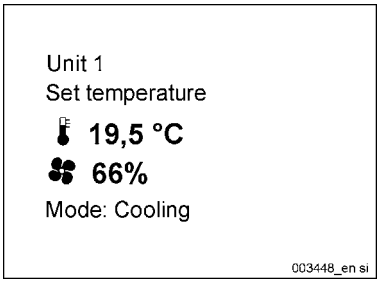
The system will now operate on inside air for the next 15 minutes. After that, the system will again switch to outside air.

To set fan speed

When the system is in automatic mode, fan speed is selected by the control unit.

Proceed as follows to change fan speed manually:

continued on next page

Step	Action	Result
1	Momentarily press the switch below.  	The menu below appears on the multifunctional display. Fan speed is rendered in percentages (from 0 to 100%). 
2	• To increase fan speed: press the upper part of the same switch. • To decrease fan speed: press the lower part of the same switch.	Fan speed changes. *NOTE: In the cooling mode, "66%" is the lowest possible fan speed setting.* *NOTE: Momentarily press the lower part of the "Climate control on/off" switch to restore automatic operation.*

Inside air too humid?

Push the switch for inside air dehumidifying. The symbol "Dehumidification of passenger compartment inside air" appears on the multifunctional display.

The system will resume normal operation after 10 minutes.

To speed up stale-air extraction

Switch on the passenger-compartment rear extractor fans by means of the dashboard switch.

Indication of exterior temperature

As you switch on the vehicle ignition, the outside temperature is shown in the RH upper corner of the multifunctional display.

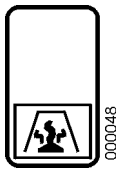
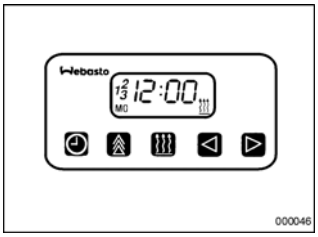
NOTE: Only when the climate control is switched on, and when the set temperature or the air flow rate is changed, the inside temperature will be indicated here during 10 seconds.

Coolant heater

Introduction

The coolant heater runs on diesel fuel. It is used to heat the coolant in the engine and interior heating system while the engine is not running or is not supplying sufficient heat. After you have turned on the device using the switch or the programmable digital control, the burner will automatically start/ stop running, in accordance with coolant temperature.

Dashboard controls

Figure	Function
	Switching on the coolant heater electrics
	Coolant heater programmable control (option)

Message on multifunc-tional display

Symbol	Message
	Coolant heater burner operating
	Coolant heater electrics on

WARNING!

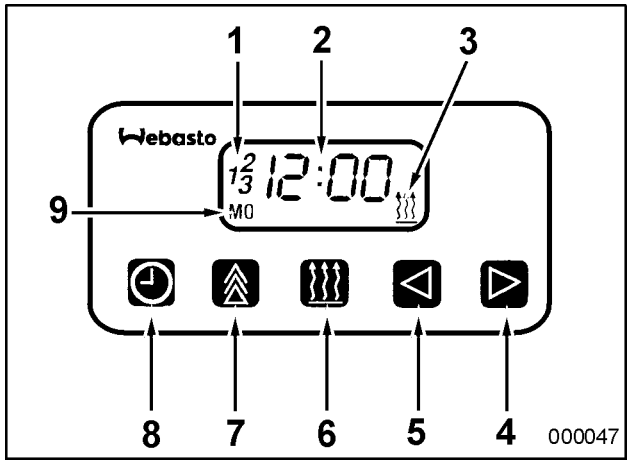
Asphyxiation hazard. Coolant heater exhaust gas is poisonous. For this reason, the interior heating or the coolant heater must not be operated in confined areas unless the coolant heater is connected to a proper exhaust removing system.

continued on next page

WARNING!

Fire hazard. Switch off the coolant heater and the interior heating before refuelling.

Figure: programmable control



1 Cut-in time reference number
2 Time indication
3 Cut-in indication, "heater running" indication and fault code indication
4 "Forward" key
5 "Reverse" key
6 Instant heater cut-in/cut-off
7 Cut-in time selection
8 Clock time and day indication
9 Day indication

To set clock time and day

Step	Action	Result
1	Press and hold key (8) for more than 2 seconds.	The time indication flashes.
2	Change the clock time with keys (4) and (5). *NOTE: If you press the key for longer than 2 seconds the time indication will run faster.*	
3	Wait 5 seconds.	The new clock time is stored, and the day indication flashes.

continued on next page

Step	Action	Result
4	Change day indication using keys (4) and (5).	
5	Wait 5 seconds.	The new day is stored.

To display clock time

If vehicle ignition...	then ...
on	the clock time and day of the week are rendered on the display.
off	briefly press key (8). The time and day indication will now display for 5 seconds.

To switch on coolant heater instantly

If vehicle ignition...	press ...
on	press key (6) momentarily. The coolant heater is now operating and will continue to do so until you press key (6) again or switch off the ignition. *NOTE: If you switch off the ignition while the heater is operating, the remaining active time (5 minutes) will flash on the display.*
off	press key (6) momentarily. The heating is now switched on for the set period (factory setting is 60 minutes).

Definition of delayed cut-out period

Amount of time (90 to 120 seconds) that the coolant-heater water circulating pump and combustion air fan will continue to operate after burner cut-out. This process ensures that temperature inside the coolant heater does not rise exceedingly after the burner has stopped working.

To switch off the coolant heater

Press key (6).

The coolant heater will start the delayed cut-out cycle and then stop working.

continued on next page

To program cut-in time

You can program up to three cut-in times simultaneously in the control memory. Cut-in time programming is indicated by a reference number to the left of the time indication.

NOTE: It is recommended that you use cut-in times "1" and "2" for programmings in the first 24 hours, and keep cut-in time "3" for a time within the next 7 days.

Step	Action	Result
1	Press key (7). *NOTE: You press key (7) several times to set starting times "2" and "3".*	The reference number for the particular cut-in time flashes.
2	Set the cut-in time with keys (4) and (5). *NOTE: If you press the key for longer than 2 seconds the time indication will run faster.*	
3	Wait 5 seconds.	The cut-in time is stored. The day of the week flashes.
4	Set the day of the week with keys (4) and (5).	
5	Wait 5 seconds.	• The day of the week is stored. • The reference number of the cut-in time remains on the display. • The timer is programmed, and will switch the heater on at the right time.

To erase time

Press button (7) until all cut-in time reference numbers disappear from the display.

To set period of operation

The heater must be off before you can set the operating period.

Step	Action	Result
1	Press key (5).	The operating period flashes.
2	Use keys (4) and (5) to set the operating period (between 1 and 120 minutes).	

continued on next page

Step	Action	Result
3	Wait 5 seconds.	Operating period has been stored. The heater stays on for the set duration (unless it has been set for continuous operation).

To change remaining operating period

The heater must be on before you can change the remaining operating period.

Step	Action	Result
1	Press key (5).	Remaining operating period is flashing.
2	Set remaining operating period using keys (4) and (5).	
3	Wait 5 seconds.	Remaining operating time has been stored.

Fault code indication

If the heater comprises a fault code indication, symbol (3) flashes to signal a fault. If a fault occurs, the heater switches off automatically. Only a Webasto technician can remedy the fault and put the heater back into service.

To open/close power-operated luggage compartment doors

Introduction

Each power-operated luggage compartment door has its own dash switch to open or close it from the driver's cab.

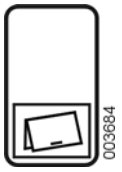
Equipment conditions

Parking brake applied

Dashboard indicator light

Light	Message
	Power-operated luggage compartment door no longer closed

Dashboard switch

Switch	Function
	To open/close power-operated luggage compartment door

To open a power-operated luggage compartment door

Press the upper section of the dashboard switch. The luggage compartment door is unlocked and opens.

The red indicator light comes on to indicate that the luggage compartment door is no longer closed.

To close a power-operated luggage compartment door

Momentarily press the lower section of the dashboard switch. The luggage compartment door closes and locks.

The red indicator light goes out when the luggage compartment door is closed.

Automatic reopening

The automatic reversing system is an anti-entrapment safety device. If the luggage compartment door strikes someone or something while closing, it

continued on next page

reopens immediately. The door will then stay open until you close it again using the switch on the dashboard.

Luggage compartment doors central locking system

Introduction

The luggage compartment doors can be locked and unlocked either with the key or through the central system from the cab.

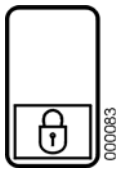
Luggage compartment doors unlocked by hand

A door which has been unlocked with the key has to be relocked with the key first, before it responds to the central locking system. Take this into consideration, when you take over the vehicle from another person. Check, whether all luggage compartment doors have actually been locked through the central system and use the key to lock the doors which are still loose.

Message on multifunctional display

Symbol	Message
	Luggage compartments have been locked through the central system. *NOTE: The symbol does not appear, unless the master switch is "on" and the engine has been switched off.*

Dashswitch

Switch	Function
	To lock luggage compartments through the central system.

To lock through dashswitch

Momentarily push the dashswitch lower part.

To lock through front passenger door

The luggage compartments are locked automatically by the central system, as you are locking the front passenger door by key.

continued on next page

To unlock

Step	Action
1	Unlock the front passenger door, if it has been locked with the key.
2	Momentarily push the dashswitch lower part. The luggage compartment doors have now been unlocked.

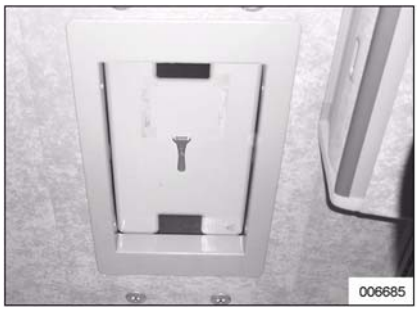
Roof hatches

Introduction

The vehicle has been equipped with roof hatches. They can be used to ventilate the interior.

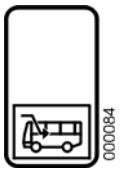
NOTE: Under normal operating conditions, the roof hatches should be closed at all times to allow for maximum efficiency of the climate control system.

Figure: types of roof hatches

Type 1 (manual)	
Type 2 (electric)	
Type 3 (electric)	

continued on next page

To open/close roof hatch

Type 1 Use both hands to turn the handle to the symbol that indicates the desired position of the hatch.	
Types 2 and 3 The roof hatches are operated by a dashboard switch. • Position 1: roof hatch closed • Position 2: roof hatch open at the back • Position 3: roof hatch open at the front and at the back	

Positions of the adjusting handle (type 1)

Symbol	Position
	Roof hatch closed
	Roof hatch open at the back: air exhaust
	Roof hatch open at the front: air intake
	Roof hatch open at the front and at the back

continued on next page

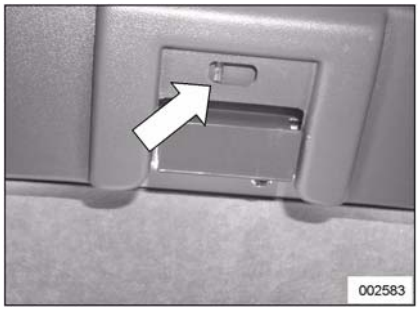
To lock a roof hatch (types 1 and 2)

WARNING!

As the outside emergency handle does not operate with the roof hatch locked, you may only lock the roof hatch with vehicle parked without passengers.

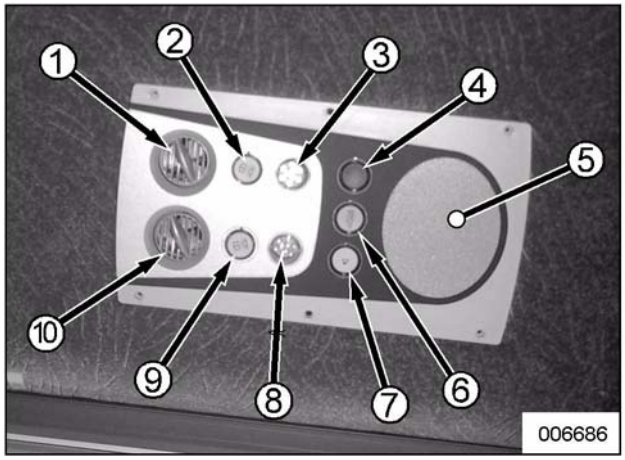
The roof hatches are locked automatically when you lock the front passenger door with the key. They will only be unlocked after you have unlocked the front passenger door and switched on the batteries.

In case of failure of the electric locking mechanism, you can also lock/unlock the roof hatch by means of the slide at the back of the roof hatch. You can operate the emergency control by hand or with a screwdriver.

The roof hatch is...	**if the slide shows...**
locked	red. 
unlocked	green.

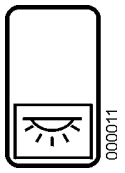
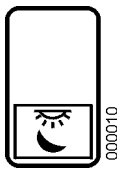
Passenger service units

Figure: Service panel:

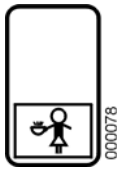


1 Adjustable air vent
2 Push-button to switch on/off reading light (3)
3 Reading light
4 Courier call push-button (red)
5 Loudspeaker
6 Passenger emergency signal ("STOP") push-button
7 Push-button (white) to switch loudspeaker on/off
8 Reading light
9 Push-button to switch on/off reading light (8)
10 Adjustable air vent

Dashboard switches

Switch	Function
	To switch passenger compartment lighting on/off • Position 0: off • Position 1: gangway lighting • Position 2: reading lights
	To switch passenger compartment night lighting on/off • Position 0: off • Position 1: night lighting • Position 2: night lighting + electrical circuit for reading lights switched on

continued on next page

Switch	Function
	To switch on courier call electrical circuit

Reading lights

The passengers can switch their reading light on or off themselves by means of a push-button on the service panel only if the passenger-compartment night-light dashboard switch is in position 2.

NOTE: The reading lights are also on when the passenger-compartment lighting dashboard switch is in position 2.

Night lights

Night lighting will operate if you put the passenger-compartment night-lighting dashboard switch in position 1 or 2.

Indicator light on dashboard

Light	Message
	Courier call

Messages on multifunc-tional display

Symbol	Message
	Courier call
	Passenger emergency call

Courier call

The passenger can ask for assistance by means of the red push-button on the service panel.

NOTE: The system only operates if the courier call system is switched on by means of the dashboard switch.

Stage	Description
1	A passenger presses the red button in.

continued on next page

Stage	Description
2	The red push-button will light and the courier is informed by means of a bell signal. On the dashboard, the green "crew call" indicator light comes on and the "crew call" symbol appears on the dashboard multifunctional display.
3	The courier assists the passenger.
4	The courier presses the red button out. The red push-button goes out, the green "crew call" indicator light on the dashboard goes out and the "crew call" symbol disappears from the dashboard multifunctional display. *NOTE: The green "crew call" indicator light only goes out and the symbol only disappears if all the push-buttons of the system have been put in raised position again.*

Passenger emergency call

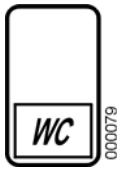
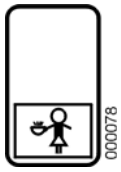
The passenger can give an emergency signal by means of the "STOP" push-button on the service panel. While the button is pressed, a message will appear on the dashboard multifunctional display and a warning tone will be heard.

Water supply

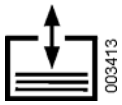
CAUTION!

If outside temperature is lower than 5 °C and you do not expect to use the sanitary installation before long, drain all water in order to prevent frost damage.

Dashboard switches

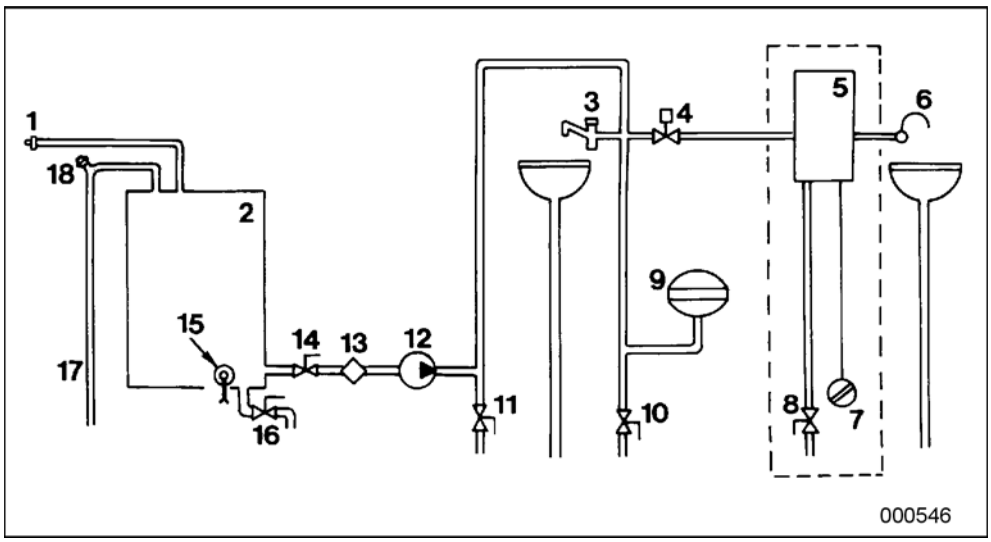
Switch	Function
	To switch on/off water supply electrical circuit
	To switch boiler electrical circuit on/off

Message on multifunctional display

Symbol	Message
	• water supply tank empty or... • waste-water tank of toilet almost full

continued on next page

Figure: water-supply diagram (standard)



1 Fill connection (line wrapped with green adhesive tape)
2 Water tank
3 Tap in toilet compartment
4 Electrically operated shut-off valve
5 Electric boiler (option)
6 Tap on top of toilet compartment
7 Boiler thermostat (option)
8 Boiler drain cock (option)
9 Pressure accumulator
10 Pressure accumulator drain-cock
11 Drain cock of circulating pump
12 Circulating pump
13 Line filter
14 Shut-off cock
15 "Water tank empty" sensor
16 Drain cock of water tank
17 Overflow line
18 Breather

Location of water-tank fill connection

Vehicle model	Location
• T915 Acron • T916 Acron • T917 Acron	On the left-hand side of the vehicle, in the luggage compartment above the drive axle
• T915 Alicron • T916 Alicron	On the left-hand side of the vehicle, in the luggage compartment ahead of the drive axle

continued on next page

How to recognise water-tank filler line

The water-tank filler line has been wrapped with green adhesive tape.

To fill water tank

Step	Action
1	Close cocks (8,10,11,16). Open cock (14).
2	Fill the water tank through connection (1), until water emerges from line (17).
3	Close the battery isolation switch.
4	Switch on the vehicle ignition.
5	Press the "WC" dashboard switch.
6	Open cock (3) until water emerges from it. In the passengers compartment press the hot water button, until water emerges from tap (6).

Location of water-supply drain cocks

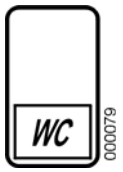
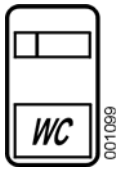
The drain cocks are located in the luggage compartment, behind the drive axle cover-plate and behind the toilet and stairs cover-plate. Access holes have been made into the cover plates. Above each hole a text label has been fitted indicating the cock the hole gives access to.

To drain the system

Open cocks (8,10,11,16).

Thetford chemical toilet

Dashswitches

Switch	Function
	To switch on/off toilet-compartment electrical circuit
	To open dump valve of toilet-compartment waste water tank (option)

Message on multifunctional display

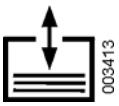
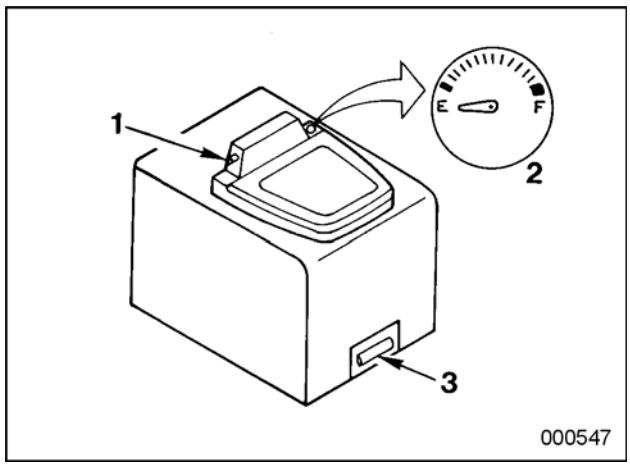
Symbol	Message
	• toilet-compartment waste water tank almost full or... • water supply tank empty

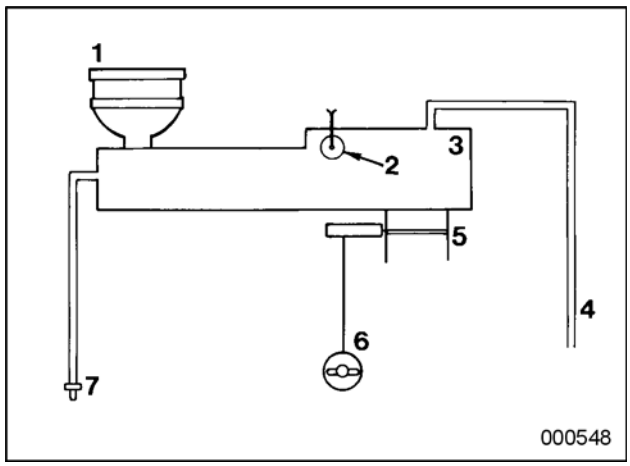
Figure: chemical toilet



1 Flush knob
2 Level indicator
3 Toilet dump valve

continued on next page

Figure: chemical toilet schematic



1 Toilet
2 "Waste-water tank almost full" sensor
3 Waste-water tank
4 Overflow line
5 Waste-water tank dump valve
6 Dump-valve handle
7 Rinse connection (line wrapped with red adhesive tape)

To fill toilet

Step	Action
1	Via the bowl fill the toilet with water (approx. 12 litres), until the pointer on the level indicator is just above the blue "CHARGED" mark.
2	**CAUTION!** **When carrying out the action below, follow the instructions on the packaging. Otherwise toilet problems will arise shortly.** Via the bowl add "Aqua Kem". The toilet is now ready for use.

To flush toilet

Press the toilet flush knob.

When to empty toilet?

When the pointer of the level indicator is in the red zone.

continued on next page

To empty toilet

Step	Action
1	Pull the handle at the base of the toilet fully out. The toilet contents are now being dumped into an additional waste-water tank.
2	When the toilet is empty, push the handle fully back home.
3	Refill the toilet as described under "To fill toilet".

To empty waste-water tank with pneumatic valve (standard)

Step	Action
1	Put a container underneath the waste-water tank drain opening.
2	Turn handle (6) in the direction of the arrow. Dump valve (5) opens and the contents of toilet waste-water tank are dumped in the container.
3	Turn handle (6) in the opposite direction of the arrow to close dump valve (5).

To empty waste-water tank with dashswitch (option)

Step	Action
1	Put a container underneath the waste-water tank drain opening.
2	Unlock the switch and press it. Dump valve (5) opens and the contents of the toilet waste-water tank are dumped in the container.
3	Release the switch in order to close dump valve (5).

Location of waste-water tank rinsing connection

Vehicle model	Location
• T915 Acron • T916 Acron • T917 Acron	On the left-hand side of the vehicle, in the luggage compartment above the drive axle
• T911 Alicron • T915 Alicron • T916 Alicron	On the left-hand side of the vehicle, in the luggage compartment in front of the drive axle

continued on next page

How to recognise rinsing line of waste-water tank

The rinsing line has been wrapped with red adhesive tape.

To rinse waste-water tank

Step	Action
1	Drain the waste-water tank, refer to "To drain waste-water tank".
2	Connect a water hose to rinse connection (7) and rinse the waste-water tank, until clear water emerges from waste-water tank drain opening.
3	Close the waste-water tank dump valve.

In winter

Replace half of the water in the toilet with ethylene glycol or propylene glycol.

Shades Technics freshwater flush toilet

Consumables

Biodegradable toilet paper (36 rolls)	Van Hool No. 11031011
Shades Super Sani RC (100 satchels containing 8 g)[a]	Van Hool No. 11028470
Shades Super Sani ECO (100 satchels containing 8 g)[b]	Van Hool No. 11028468

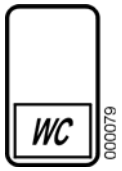
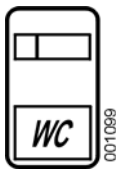
a. Ammonium base, biodegradable

b. Does not contain any chemicals, biodegradable

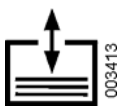
CAUTION!

If outside temperature is lower than 5 °C and you do not expect to use the facility before long, drain all water in order to prevent frost damage.

Dashboard switches

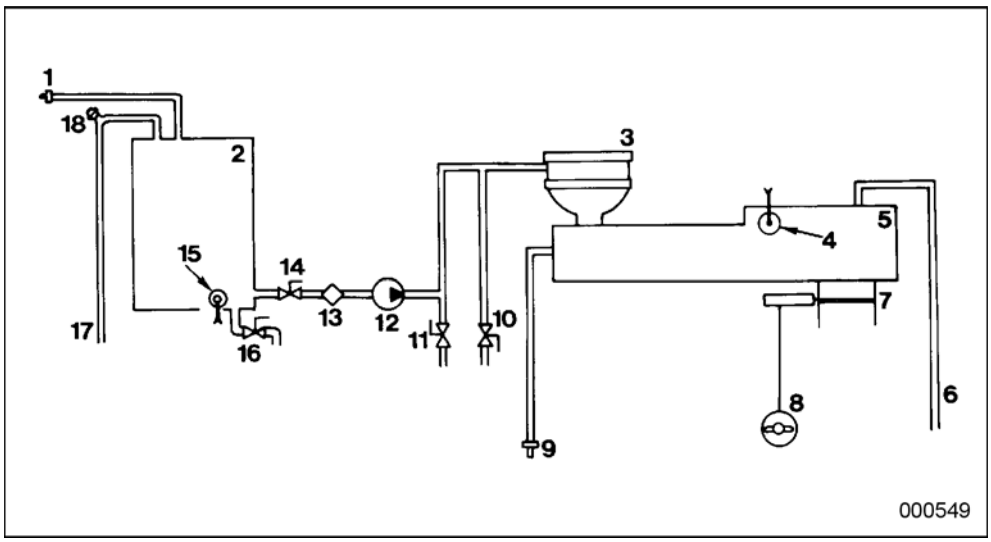
Switch	Function
	To switch on/off toilet-compartment electrical circuit
	To open dump valve of toilet waste water tank (option)

Message on multifunctional display

Symbol	Message
	• toilet flush water tank empty, or... • toilet waste-water tank almost full or... • water-supply tank empty

continued on next page

Figure: installation of toilet with fresh-water flushing



1 Fill connection (line wrapped with blue adhesive tape)
2 Flush-water tank
3 Toilet
4 "Waste-water tank almost full" sensor
5 Waste-water tank
6 Overflow line
7 Waste-water tank dump valve
8 Dump valve control handle
9 Rinse connection (line wrapped with red adhesive tape)
10 Drain cock of toilet
11 Drain cock of circulating pump
12 Circulating pump
13 Line filter
14 Shut-off cock
15 "Water tank empty" sensor
16 Drain cock of water tank
17 Overflow line
18 Breather

To flush toilet

Press the flush knob in the toilet compartment.

To fill flush-water tank

Step	Action
1	Close cocks (10,11,16). Open cock (14).

continued on next page

Step	Action
2	Fill flush-water tank through connection (1), until water emerges from line (17). The flush-water tank fill connection has been wrapped with blue adhesive tape.
3	Close the battery isolation switch.
4	Switch on the vehicle ignition.
5	Depress the "WC" dashboard switch.
6	Press the toilet flush button until the water starts running.
7	Throw the content of two satchels "Shades Super Sani" in the bowl and press the flush button once again.

To drain the system

Step	Action
1	Open cocks (10,11,16).
2	Drain the waste-water tank, refer to "To drain waste-water tank".

To drain waste-water tank with pneumatic valve (standard)

Step	Action
1	Put a container underneath the waste-water tank drain opening.
2	Turn handle (8) in the direction of the arrow. Dump valve (7) opens and the contents of the toilet waste-water tank are dumped into the container.
3	Turn handle (8) in the opposite direction of the arrow to close dump valve (7).

To drain waste-water tank with dashboard switch (option)

Step	Action
1	Put a container underneath the waste-water tank drain opening.
2	Unlock the switch and press it. Dump valve (7) opens and the contents of the toilet waste-water tank are dumped into the container.
3	Release the switch in order to close dump valve (7).

continued on next page

Location of waste-water tank rinsing line

Vehicle model	Location
Acron	On the left-hand side of the vehicle, in the luggage compartment above the drive axle
Alicron	On the left-hand side of the vehicle, in the luggage compartment ahead of the drive axle

To rinse waste-water tank

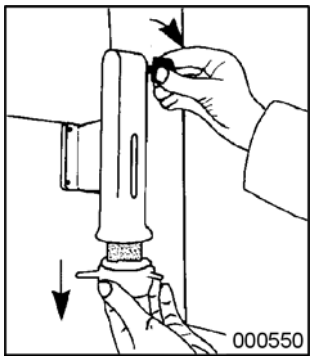
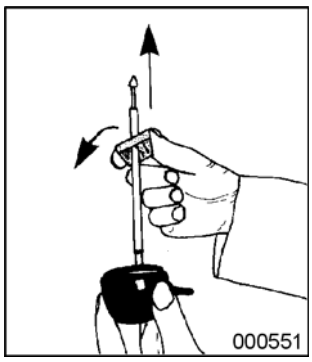
Step	Action
1	Drain waste-water tank, refer to "To drain waste-water tank".
2	Connect a water hose to rinse connection (9) and rinse the waste-water tank, until clear water emerges from waste-water tank drain opening. The rinsing line has been wrapped with red adhesive tape.
3	Close the waste-water tank dump valve.

Minor maintenance

- Every week, apply a few drops of silicon oil or detergent to the shut-off valve at the bottom of the bowl. This will considerably extend the life of the shut-off valve.
- Clean the bowl with a soft antibacterial washing agent and a suitable brush. Do not use an abrasive to clean the bowl!

Soap dispenser

To fill soap dispenser

Step	Action
1	Hold handwheel firmly.
2	Insert special key (onboard tool kit) in opening on top of soap dispenser and turn key counterclockwise. 
3	Pull soap container out of housing and remove key.
4	Tilt clamping plate and slide it off rod. 

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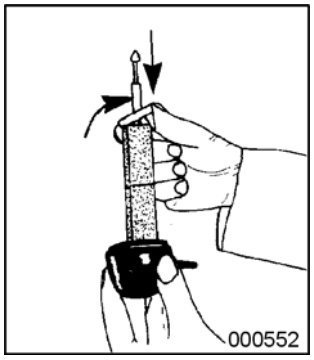
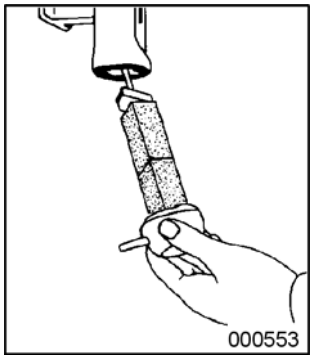
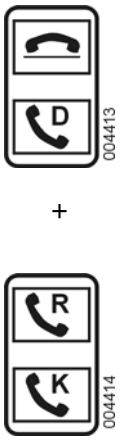
Step	Action
5	Slide two soap bars onto rod and secure them with clamping plate. 
6	Slide back soap container into housing. 

Intercom system

What is intercom?

Intercom is a communication system between different compartments in the vehicle.

Dashboard switches

Switch	Function
	To switch intercom system on/off (in the case of one telephone in the vehicle)
	To switch intercom system on/off (in the case of two or three telephones in the vehicle)

To switch intercom system on

NOTE: The location of the telephones may vary depending on the vehicle type and the chosen options.

NOTE: The lamp in the switch lights when the system is switched on.

NOTE: The driver does not have a telephone at his disposal but he communicates through his microphone and the loudspeaker in the driver's cab.

If you want to...	**you momentarily press the switch with the letter ... .**
phone the person in the sleeping cabin	"R"
phone the person on the upper deck	"D"
phone the person in the kitchenette	"K"

continued on next page

To switch off the intercom system

Momentarily press the top of this switch. The lamp in the switch of the intercom circuit that was active goes out.

Blaupunkt entertainment system control

For details Refer to manuals by the manufacturer. These manuals are supplied separately with the new vehicle.

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Chapter 4: Care and maintenance

Overview

Introduction

This chapter contains a limited number of maintenance instructions. For the intention of garage personnel, instructions for other necessary maintenance works have been included in a maintenance manual also supplied with the vehicle.

Number of pages

10

Chapter publication date

30 October 2007

Contents

Topic	See page
To check engine oil level	4-2
To check coolant level	4-4
To check air-filter condition	4-7
To check tyre inflation pressure and tyres for damage	4-8
To check air-suspension operation visually	4-9

To check engine oil level

To be carried out when?

Before commencing daily service.

Equipment condition

Vehicle on level ground.

CAUTION!

Never top up oil over the maximum mark on the dipstick. This can result in serious engine damage.

Location of oil filler cap and dipstick

Refer to "Access doors and controls on the outside".

Procedure with cold engine

Step	Action
1	Pull out the dipstick.
2	Wipe the dipstick clean with a lint-free cloth and reinsert it for a few seconds, before reading the oil level. The oil level should be between the two marks.
3	If the oil level is too low, top up oil via the oil filler cap.

Procedure with hot engine

Step	Action
1	Let the engine idle for 30 seconds after driving. Then turn the engine off.
2	Wait a few minutes so the oil can flow back into the sump.
3	Pull out the dipstick.
4	Wipe the dipstick clean with a lint-free cloth and reinsert it for a few seconds, before reading the oil level. The oil level should be between the two marks.
5	If the oil level is too low, top up oil via the oil filler cap.

continued on next page

Effect of engine temperature	Differences in level between a cold and a hot engine are normal. A reliable oil level can only be determined if the engine is cold and has been off for several hours.
Do you have to add oil often?	If you have to add oil often, check for major oil leaks.

To check coolant level

To be carried out when?

Before commencing daily service.

Equipment condition

Cold engine

WARNING!

Never open the filler cap, if the coolant thermometer indicates more than 50 °C. Due to the pressure hot water may be blown out and cause scalds.

WARNING!

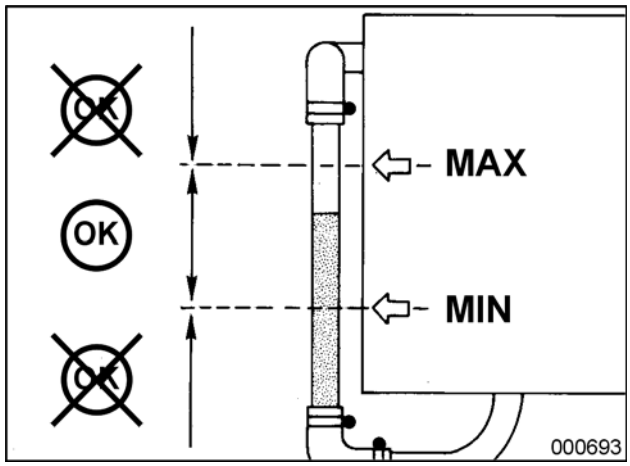
If the filler cap has to be opened with the engine hot, first carefully turn it counterclockwise to the first stop and let the pressure off. Then turn it to the second stop and remove the cap.

CAUTION!

Never pour cold coolant in the expansion tank with the engine hot. The sudden cooling may cause parts of the engine block to crack.

continued on next page

Figure: coolant level



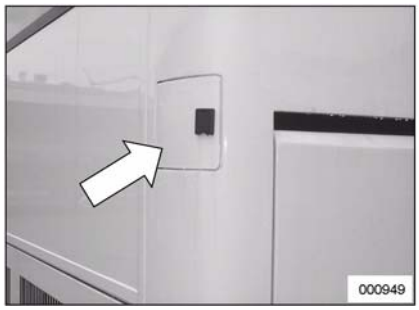
Correct coolant level

The coolant level is correct when between the "MIN" and "MAX" marks on the expansion tank.

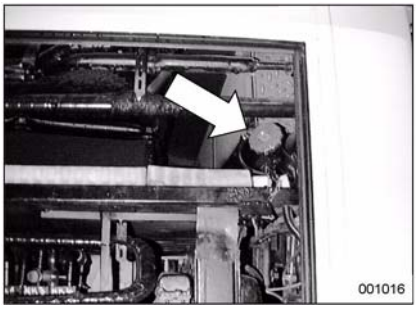
To top up cooling system

Always top up with water containing the appropriate quantity of antifreeze. Adding "pure" water will lower the concentration of protective substances in the installation, which in turn will increase the possibility of deposits, corrosion and freezing.

Access to expansion tank filler cap

On the...	the filler cap can be accessed...
• T916/917 Acron • T916/917/918 Altano • T916/917 Astron	through a lid on the left at the very back. 

continued on next page

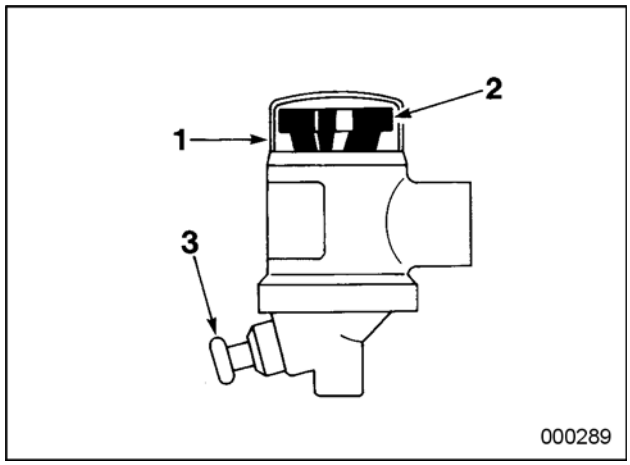
On the...	the filler cap can be accessed...
• TD924/925/927 Astromega	through the exterior door on the left at the very back. 

To check air-filter condition

To be carried out when?

Before commencing daily service.

Figure: air-filter restriction indicator



1 Transparent cap
2 Signal button
3 Reset button

Procedure

Check condition of air filter by observing restriction indicator.

If, ...	**then...**
with engine stopped, red signal button (2) is within transparent cap (1),	air-filter element should be changed as soon as possible.

To check tyre inflation pressure and tyres for damage

To be carried out when?

Before commencing daily service.

Tyre inflation pressure

Refer to "Vehicle technical data". The given pressure values apply to cold tyres, that is, after at least 1 hour of standstill.

CAUTION!

If checks reveal that over time pressure has dropped more than normal, remove and inspect the tyre to determine the cause.

Tyre damage

Remove any stones or similar which have become lodged in the tread. These can cause damage in the long run.

Change tyre, if you encounter any of the following signs of damage:

- bumps or bubbles;
- splits, cracks or tears extending up the side walls;
- visible side wall fibres.

To check air-suspension operation visually

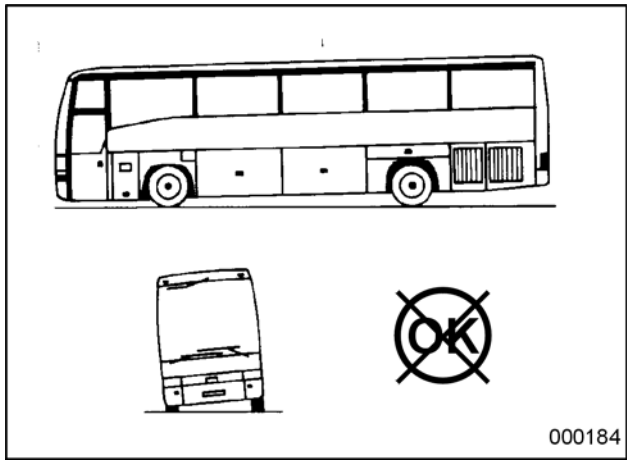
To be carried out when?

Before commencing daily service.

Equipment condition

- Normal operating pressure in the air system
- Vehicle on level ground

Figure: to check air suspension



Procedure

Visually check that normal body ground clearance is maintained at both ends and sides of the vehicle: the body should not lean over.

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Chapter 5: Driving

Overview

Introduction

This chapter deals with the driving.

Number of pages

46

Chapter publication date

9 April 2009

Contents

Topic	See page
To run in vehicle	5-3
Daily pre-starting checks	5-4
Battery isolation switch	5-5
Ignition key	5-7
Dashboard information on engine cooling	5-8
Dashboard information on engine-oil pressure	5-9
Dashboard information on fuel system	5-10
Dashboard information on engine revolutions	5-11
Dashboard information on compressed-air feed system	5-12
Dashboard information on electric power supply	5-14
Dashboard information on multiplex system	5-15
To start/switch off engine	5-16
Clutch	5-19
DaimlerChrysler GO... gearbox	5-20
To drive off	5-22
Reversing warning	5-24
Exhaust aftertreatment	5-26
To drive with anti-spin regulation (ASR)	5-27
Adjustable speed limiter	5-28
Cruise control	5-30
Retarder	5-32
Service brakes	5-35
To drive with ABS	5-37

continued on next page

Topic	See page
Bus-stop brake	5-39
Parking brake	5-41
Parking brake emergency release	5-43
What to do, if power steering fails during service?	5-45

To run in vehicle

What to pay attention to during the running-in period

In order to allow all parts of the driveline to run in properly, it is recommended not to strain the new vehicle to its limits immediately. This also applies, if a new or reconditioned engine, gearbox or drive axle has been installed. Do not apply full throttle during the first 2 000 km. After that, engine speed may be gradually increased to maximum (2 150 rpm).

Daily pre-starting checks

Check following points

- oil level in oil sump;
- coolant level;
- air-cleaner condition by means of restriction indicator;
- fluid level in windscreen washer tank;
- driver's seat, steering column and exterior mirrors positions;
- operation of the exterior lighting and signals.

Battery isolation switch

Introduction

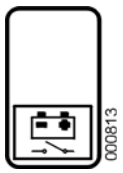
A battery isolation switch is used to cut the power to the vehicle's electrical system by disconnecting the batteries.

Number of battery switches

NOTE: Vehicles with additional battery banks have a mechanical battery switch for each battery bank.

A...	is located ...	and is intended for use by ...
electrical battery isolation switch	on the dashboard	driver
mechanical battery isolation switch	close to the batteries	service personnel.

Electrical battery isolation switch

Switch	Function
	To switch batteries on or off. *NOTE: A safety system prevents you from switching batteries off with the electrical battery isolation switch at road speeds above 3 km/h.*

Cut-off delay

The batteries are not cut off immediately when you turn the electrical switch off. The engine EDC electronics carry out a few checks first. Only after that will the batteries be cut off.

Location of mechanical battery switch

Refer to "Access doors and controls on outside".

Pay attention to the following, before turning on the mechanical switch

Observe the following precautions to avoid damaging the vehicle's alternator or deranging any electronic systems.

continued on next page

CAUTION!

Never turn the mechanical battery isolation switch off while the engine is running.

CAUTION!

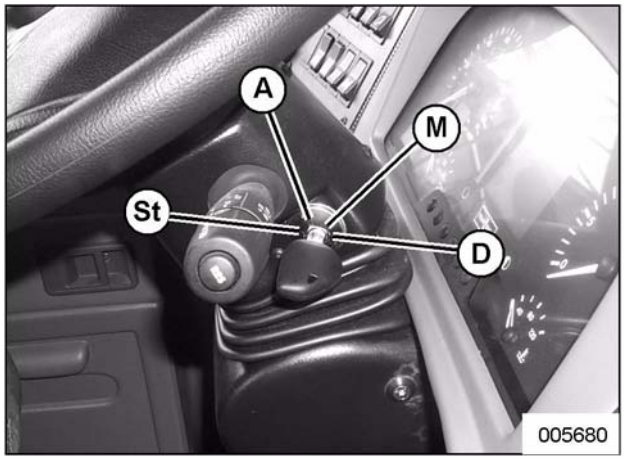
Never turn the mechanical battery isolation switch off while the electrical battery isolation switch is on.

CAUTION!

Wait at least 30 seconds after turning the electrical battery isolation switch off before you turn the mechanical battery isolation switch off.

Ignition key

Figure: ignition key



Ignition key positions

The ignition key has four positions.

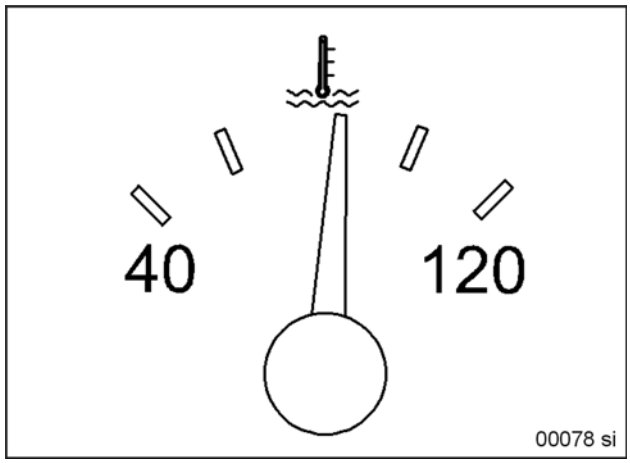
Position	Function
St	Off (position for insertion or removal of key)
A	Not connected.
M	Contact on.
D	Starting the engine. Key springs back to position "M" when released.

Dashboard information on engine cooling

Messages on multifunctional display

Symbol	Message
	Coolant temperature too high. Stop vehicle and switch off engine. Contact maintenance personnel for assistance.
	Coolant level in expansion tank too low. Also lights for a few seconds when ignition is switched on, to indicate that the warning system is functioning.

Figure: coolant temperature gauge on dashboard



Operating temperature

Normal engine operating temperature is between 80 and 90 °C.

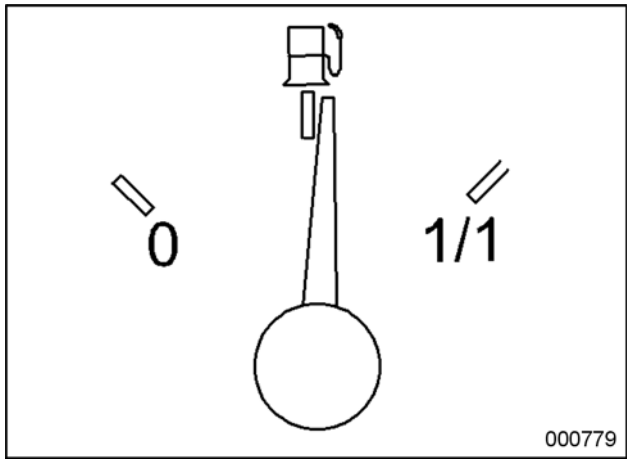
Dashboard information on engine-oil pressure

Message on multifunctional display

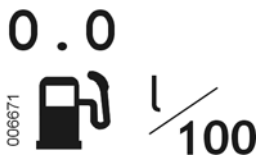
Symbol	Message
	Engine-oil pressure too low. Stop vehicle and switch off engine. Contact maintenance personnel for assistance.

Dashboard information on fuel system

Fuel level gauge



Message on multifunctional display

Symbol	Message
	Tank fuel level low
	Fuel consumption

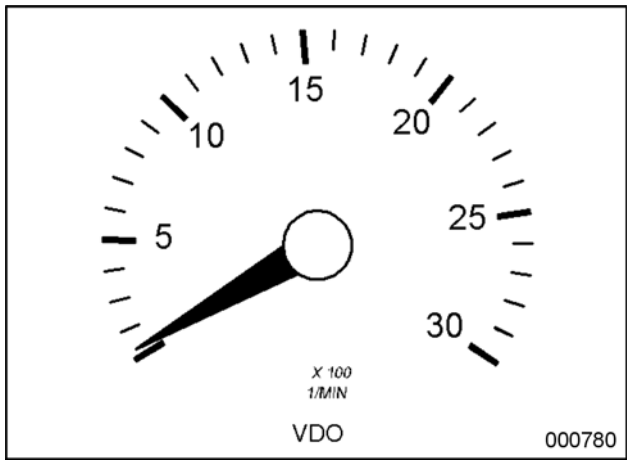
Fuel consumption

As soon as the engine is running, an approximate indication of the fuel consumption is shown in the RH lower corner of the multifunctional display. By means of the second push-button from the right under the multifunctional display, you can switch between average and present fuel consumption. To reset the counter of the average fuel consumption, hold this button for more than 5 seconds.

NOTE: After using the central emergency switch on the dashboard, reset the average fuel consumption counter.

Dashboard information on engine revolutions

Figure: revolution counter



CAUTION!

The engine speed should never exceed 2 400 rpm. Engine overspeeding can result in serious engine damage.

When going downhill

The electronic control unit of the EDC system has no control over engine speed, when the engine is being driven by the wheels of a vehicle that is going downhill. It is your responsibility to keep engine speed under control by reducing vehicle speed.

Maximum torque

For the engine speed at which the engine develops its maximum torque, refer to "Vehicle specification".

Dashboard information on compressed-air feed system

Introduction

The multifunctional display on the dashboard also provides information on the pressure in the compressed-air tanks and on braking pressure.

NOTE: The brake pressure screen only appears on vehicles for Luxemburg.

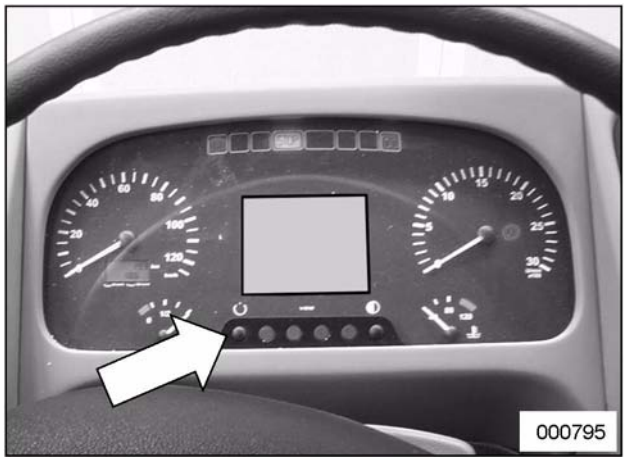
Operating condition for multifunctional display

Ignition on

Message on multifunctional display

Symbol	Message
	Pressure in compressed-air tank too low.

Figure: multifunctional display selector button

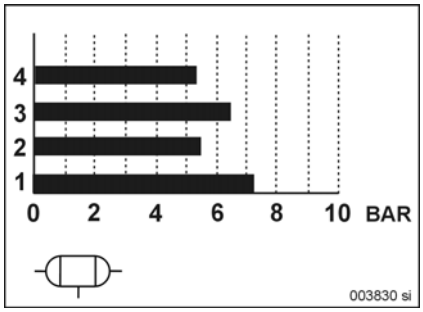
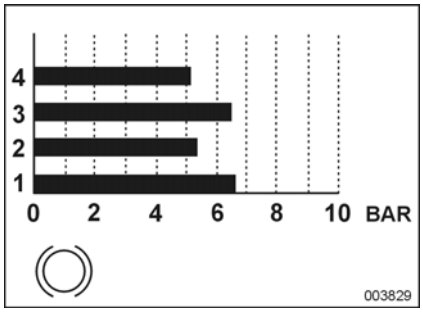


To display air-pressure gauges

Press the selection button on the multifunctional display as many times as needed until the desired screen appears. The screen will remain visible for 10 seconds

continued on next page

Figure: air-pressure gauges

Air-pressurre gauge	Figure
Tank pressure of the service brakes, per axle 1 Axle 1 2 Axle 2 3 Axle 3 4 Axle 4	
Braking pressure of the service brakes, per axle 1 Axle 1 2 Axle 2 3 Axle 3 4 Axle 4	 *NOTE: Maximal braking pressure is 8 bar.*

Normal braking values

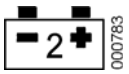
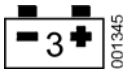
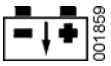
The normal operating pressure is between 8,3 and 8,9 bar.

9,5 bar is the maximum pressure in the compressed-air tanks.

If pressure falls below 8,3 to 8,9 bar, the compressor starts to recharge the tanks.

Dashboard information on electric power supply

Messages on multifunctional display

Symbol	Message	Action required
	Alternator no. 1 does not supply current	Switch off as many unimportant power consumers as possible and drive to the nearest repair shop.
	Alternator No. 2 does not supply current.	Switch off as many unimportant power consumers as possible and drive to the nearest repair shop.
	Third alternator does not supply current	Switch off as many unimportant power consumers as possible and drive to the nearest repair shop.
	On-board voltage too low. The alternators provide too little current to supply all consumers. The batteries may drain too much.	Switch off as many power consumers as is necessary to have the symbol disappear.
	Over-current in electrical system. The engine will stop.	Stop the vehicle as soon as possible. Ask for assistance of maintenance personnel.

Dashboard information on multiplex system

Dashboard function failure

If you see the message "System failure" on the multifunctional display, this indicates that the dashboard switches, buttons and instruments are no longer operative.

Figure: dashboard function failure message

The figure shows the German-language version. Other languages are possible.

What to do if the dashboard functions fail?

Park the vehicle beside the road as quickly as possible and request assistance from maintenance personnel. Leave the engine idling until maintenance personnel decides to switch it off. If you do switch off the engine, you will not be able to restart it until the multiplex system has been repaired.

How to stop the engine in the case of dashboard function failure?

You can only stop the engine by switching off the battery switch while the vehicle is stationary or not moving faster than walking pace.

To start/switch off engine

Engine starting only possible...

- if the gearbox is in neutral
- from the dashboard, if the engine compartment access door is closed.

CAUTION!

To save the batteries and the starter motor: do not engage the starter motor for more than 10 seconds at a time. Wait at least 30 seconds between two starting attempts.

CAUTION!

After starting, do not rev the engine before the oil pressure symbol on the display goes out.

CAUTION!

Stop the engine at once if the low oil pressure warning does not go out soon after the engine has been started.

To start engine

NOTE: Do not depress the accelerator pedal while starting.

Step	Action
1	Check whether the parking brake is on.
2	Make sure the gearbox is in neutral.
3	Switch on the battery isolating switch on the dashboard.

continued on next page

Step	Action
4	Turn the ignition key to position "M". • Some warning symbols will now appear on the multifunctional display. Some of them will disappear after a few seconds, others will remain visible, until vehicle speed exceeds walking pace. Yet others will not disappear, until you switch off the system they are linked with. • The red central warning light will remain on until you release the parking brake. • The yellow central warning light should go out when vehicle speed exceeds walking pace, at the latest.
5	Turn the ignition key to position "D". The starter motor operates. *NOTE: From this position you can make only one starting attempt. To reengage the starter motor, you have to turn back the key to position "St" first. Wait about 30 seconds before trying to start again.*
6	As soon as the engine fires, release the key. The key will automatically return to position "M".

Starting problems?

Follow the procedure below, if the engine will not start after several attempts.

Step	Action
1	Turn the master switch off for at least 30 seconds.
2	Make a new starting attempt, see under "To start the engine". If the engine still will not start, this indicates a serious problem which needs the attention of a technician.

CAUTION!

By no means must the engine be raced just before you stop it. To do so causes damage to the turbocharger. The turbocharger would continue running at high speed without being lubricated.

To stop engine

Step	Action
1	Stop the vehicle.
2	Put gearbox in neutral.

continued on next page

Step	Action
3	Apply the parking brake. *NOTE: You will hear a warning tone if the parking brake is not on when you turn the ignition off.*
4	*NOTE: If coolant temperature exceeds 90 °C, it is advised to have the engine idle for 1 to 2 minutes, before switching it off.* Turn the ignition key to position "St". The engine stops.

Clutch

Friction clutch

In your vehicle a friction clutch is being applied to transmit the engine torque to the gearbox. This friction clutch is subject to wear.

To slow down clutch wear

In order to slow down clutch wear, it is important:

- to drive off in 1st gear at all times...
- not to accelerate, as you are releasing the clutch pedal.

NOTE: A number of vehicles have been equipped with a system that prevents the 2nd gear from being engaged at standstill.

DaimlerChrysler GO... gearbox

Number of gears

The gearbox has six synchronised forward and one reverse gear.

To operate clutch pedal

- Always depress the clutch pedal fully in order to avoid premature wear of the synchro rings in the gearbox.
- There is no need for double-declutching or accelerating in neutral.

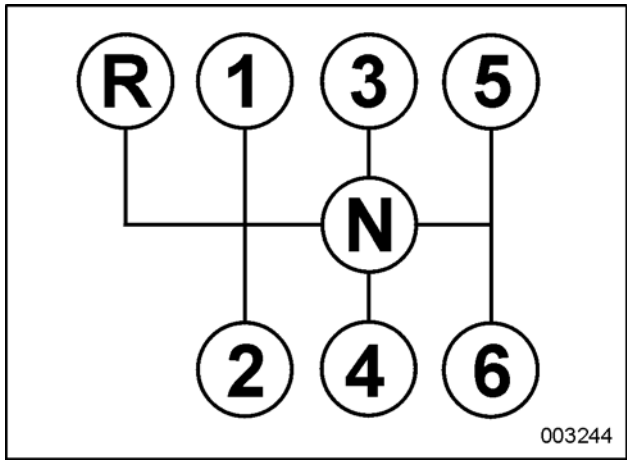
To drive off from standstill

Always drive off in 1st gear.

Slopes

When driving up slopes, it is advised not to change down, until engine speed has dropped to maximum torque speed (refer to "Vehicle specification").

Figure: gear changing pattern



CAUTION!

If you engage a wrong gear, causing the engine to over-speed, severe engine as well as clutch and gearbox damage may be the result.

To change gear

- Change up in the right sequence, without skipping any gears.
- Keep the pointer on the dashboard revolution counter within the green area as much as possible. Also, never have engine speed exceed 2 400 rpm.

continued on next page

- Changing from forward to reverse or vice versa must be performed at vehicle standstill.
- Change down as soon as vehicle speed drops below the minimum speed of the gear engaged (engine starts to jerk).

To drive off

To drive off

Step	Action
1	After the engine has started, wait until the compressed-air circuits have been pressurised, i.e. until the low air-pressure warning has gone out.
2	Fully depress the clutch pedal and engage first gear (or reverse).
3	Release the parking brake.
4	Release the clutch pedal.

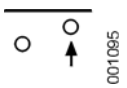
To drive off under unfavourable conditions

Under unfavourable conditions (for example on slippery slopes) the drive axle wheels may spin as you drive off.

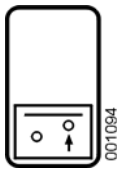
In that case press the dashboard switch "trailing axle load reduction". The load on the trailing axle will be reduced for 30 seconds. This causes pressure on the drive axle to almost double, which in turn improves the grip of the drive axle wheels considerably. After 30 seconds load is distributed in the normal way between the three axles once again.

NOTE: The load reduction system operates at vehicle speeds lower than 30 km/h only.

Message on multifunctional display

Symbol	Message
	Trailing axle load reduction operating

Dashboard switch

Switch	Function
	Trailing axle load reduction

continued on next page

To warm up the engine

After starting a cold engine, watch coolant temperature gauge. You must not operate the engine at full power, before the temperature is at least 80 °C. Drive at moderate speed, until this temperature is reached.

Reversing warning

Introduction

Four sensors have been installed over the total width of the rear bumper of the vehicle for detecting obstacles when reversing. The maximum range of the sensors is approximately 3 metres.

A display on the dashboard and a beeper indicate:

- which side of the vehicle is nearing the obstacle and...
- the distance between the obstacle and the vehicle.

CAUTION!

Situations might occur whereby the obstacle falls within the dead angle of the sensors. In that case, no information or faulty information will be given.

Operating conditions

- ignition on;
- reverse gear engaged.

Figure: display for reversing warning

Which side of the vehicle is nearing the obstacle?

When ... comes on in the display...	the vehicle nears the obstacle...
the RH row of lamps	with its RH side
the LH row of lamps	with its LH side

continued on next page

When ... comes on in the display...	the vehicle nears the obstacle...
one of the middle rows of lamps	with the centre part of the rear bumper

What is the distance between the obstacle and the vehicle?

The digits on the display indicate the distance to the obstacle in centimetres. The coloured lamps in the display and a beeper also indicate the distance to the obstacle.

If the ... light comes on...	and you hear the following series of tones...	then the distance to the obstacle is...
blue	(none)	between 3 m and 1,5 m
green	Bi.....Bi.....Bi...	between 1,5 m and 0,95 m
yellow	Bi...Bi...Bi...Bi...	between 0,95 m and 0,4 m
red	Biiiiiiiii...	closer than 0,4 m

CAUTION!

If the red lamp comes on, stop the vehicle immediately.

Exhaust aftertreatment

Introduction

Your vehicle has been equipped with a particulate filter in the engine exhaust system. This filter stops and burns diesel soot generated by the engine, so that only "clean" exhaust gas is emitted.

Operating condition

The particulate filter only works optimally when exhaust gas is hot enough, i.e. with engine under load. Therefore, do not let the engine idle unnecessarily for too long, as unburnt soot will collect in the filter.

Message on multifunctional display

Symbol	Message	Action required
	Appears when the ignition is switched on to indicate that the warning system is functioning. If the engine runs and there is no malfunction, the message will disappear within 10 seconds.	If the symbol does not disappear, ask for technical assistance.
	If the symbol appears while driving, this indicates a problem influencing the quality of the engine exhaust gas.	Ask for technical assistance.

To drive with anti-spin regulation (ASR)

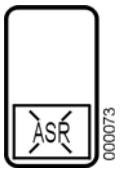
Introduction

The ASR is an electronic control unit, which prevents the drive axle wheels from spinning, if you accelerate too much.

Message on multifunctional display

Symbol	Message
	• Is displayed with each ASR intervention. • Blinks for as long as ASR system effectiveness is being reduced by means of the ASR dashswitch.

Dashswitch

Figure	Function
	To reduce effectiveness of ASR system

Driving over a sill of snow

If, when driving off, you cannot manage to get the drive wheels over a sill of snow, because ASR is restricting engine speed too much (almost no traction left), you had better accelerate with reduced ASR effectiveness: perhaps the spinning wheels will cause the snow to melt and thus get grip after all.

To reduce ASR effectiveness

Momentarily push dashswitch lower part.

The ASR symbol will flash on the multifunctional display.

To switch ASR back to normal

Momentarily push dashswitch lower part.

The ASR symbol on the multifunctional display will disappear.

NOTE: The ASR will also revert to normal when you turn off the ignition.

Adjustable speed limiter

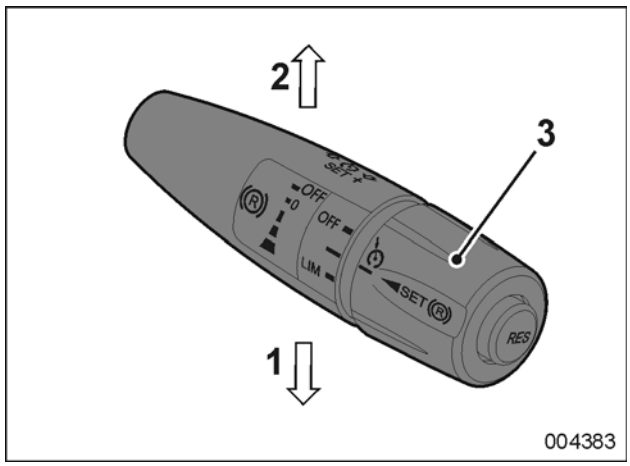
Introduction

With the adjustable speed limiter you can set a speed limit between 35 km/h (30 km/h for DAF engine) and the maximum speed permitted by traffic regulations.

Message on multifunctional display

Symbol	Message
	Speed limiter switched on

Figure: RH combination switch on steering column



1 To decrease set speed
2 To increase set speed
3 Speed limiter on/off

To switch on speed limiter

Turn switch (3) to position "LIM" while the vehicle travels at a speed you wish to set as maximum speed.

NOTE: The cruise control is switched off when you cut in the speed limiter.

To adjust maximum speed

Pull lever upward (2) to increase speed or push it downward (1) to reduce speed. Release the lever as soon as vehicle is travelling at the desired speed.

The new maximum speed has now been stored in the memory.

continued on next page

To switch off speed limiter	Turn switch (3) back to mid-position.

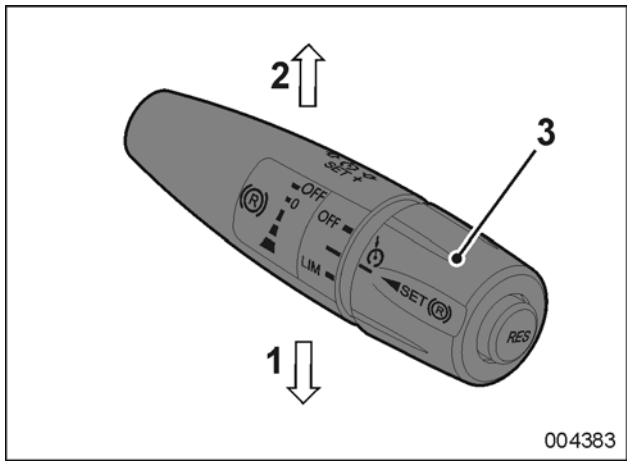
Cruise control

Introduction

With the cruise control you can drive at a fixed speed without having to hold your foot on the accelerator pedal.

NOTE: The minimum vehicle speed for cruise control operation is 30 km/h.

Figure: RH combination switch on steering column



1 To decrease speed
2 To increase speed
3 To switch off cruise control

To switch on cruise control

Briefly move the lever at the steering column upward (2) or downward (1). The system is now switched on.

To adjust set cruising speed

Pull lever upward (2) to increase cruising speed or push it downward (1) to reduce cruising speed. Release the lever as soon as the vehicle is travelling at the desired speed.

The new cruising speed has now been stored in the memory.

To switch off cruise control

Momentarily turn switch (3) to the "OFF" position.

The cruise control is also switched off if:

- you operate the brake pedal, the clutch pedal or the retarder, or...
- vehicle speed drops below 30 km/h, or...
- the speed limiter is switched on.

NOTE: By pushing the "RES" button, the cruise control cuts in again taking the last set vehicle speed as a reference.

continued on next page

To change idling speed

You can change idling speed with the vehicle at standstill and the engine on.

To...	you have to...
increase idling speed in one go to 1 000 rpm	press the "RES" button.
increase idling speed without intermediate stages to a maximum of 1 350 rpm	pull steering column handle upward (2), until the desired speed is reached. *NOTE: In case of a DAF engine, you can increase engine speed by stages of approximately 25 rpm. To do so, momentarily pull the handle upward.*
decrease idling speed to a minimum of 600 rpm	push steering column handle downward (1), until the desired speed is reached. *NOTE: In case of a DAF engine, you can decrease engine speed by stages of approximately 25 rpm. To do so, momentarily push the handle downward.*

To return to normal idling speed

- Momentarily turn switch (3) to the "OFF" position, or...
- press the brake pedal or the clutch pedal.

Retarder

Applicable models

Coaches with DaimlerChrysler GO... gearbox

Introduction

- The retarder is particularly suited for continuous braking during descents. By using the retarder you can spare the wheel brakes.
- Braking power is independent of the gear selected.

Message on multifunctional display

Symbol	Message
	The symbol appears if the retarder is operating or if there is a fault. • Serious failure: retarder is switched off. You can continue to drive, but adjust your speed. Drive to the nearest repair shop immediately. • For a less serious fault you can continue to use the retarder, but not at full capacity any more. Drive to the nearest repair shop. The symbol flashes if the temperature limiter (see later) starts to operate. *NOTE: When you switch on vehicle ignition, the symbol will also appear for 5 seconds.*

Temperature limitation

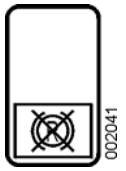
Inside the retarder, braking energy is transformed into heat. Some of this heat is removed via the oil and a heat exchanger to the engine cooling system. If the temperature of the oil or the coolant rises too high, the electronics will reduce the braking power available.

CAUTION!

Proceed as follows if the temperature limiting system begins to operate (brake retarder symbol flashes): slow the vehicle using the service brakes and change to the lowest possible gear. Continue in this state until full braking power is available again from the retarder (brake retarder symbol stops flashing).

continued on next page

Dashboard switch

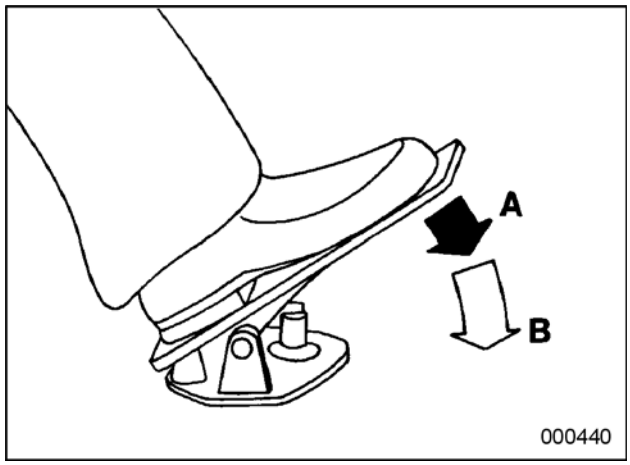
Switch	Function
	To disconnect retarder foot control.

To operate retarder

You operate the retarder:

- with the service brake pedal or...
- with RH combination switch (four positions: 0,1,2,3) on the steering column.

Figure: brake pedal



Pedal travel A: retarder actuation
Pedal travel B: retarder and compressed-air brakes actuation

Foot control

The retarder will be activated when you depress the service brake pedal within the initial part of its travel. Only if you depress the pedal still further, will the compressed-air brakes be activated as well.

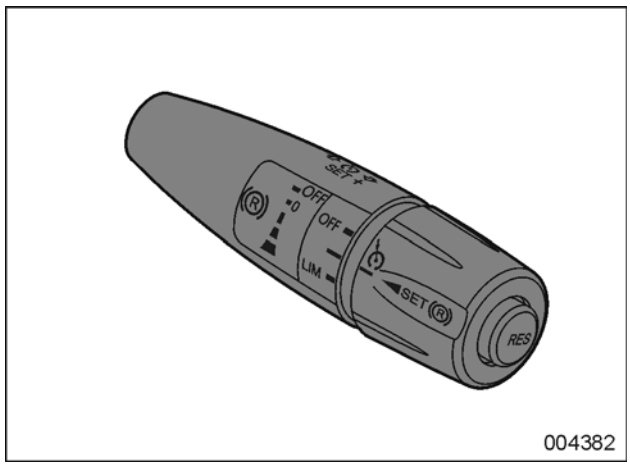
To disconnect foot control

Use the "R" dashboard switch to disconnect the retarder from the brake pedal.

Do not disengage the switch, unless retarder operation might lead to higher skidding risk (slippery road, empty vehicle).

continued on next page

Figure: RH combination switch on steering column



Hand control

NOTE: The functions "OFF" and "SET(R)" have not been connected.

- Hand control is particularly suited for continuous braking during descents.
- The lever offers the possibility to measure out braking power in three stages.
- Never move the lever to the maximum braking power position in one stroke; make a brief pause in each intermediate position. Thus braking power will be progressive, without jerks (risk of skidding).
- When returning to the "0" position, however, you may move the lever in one go.

Automatic braking

The retarder is also fitted with an automatic braking feature. This automatic function limits vehicle speed to the value which was reached, when:

- you released the accelerator pedal;
- you released the brake pedal;
- you switched off cruise control;
- you moved back the control lever into the "0" position.

This specifically means that, when you release the brake pedal during a descent, the automatic braking feature will keep vehicle speed constant. If vehicle speed increases anyway, this means the braking power required to keep speed constant exceeds the power the retarder can provide, and you will have to use the service brakes in addition.

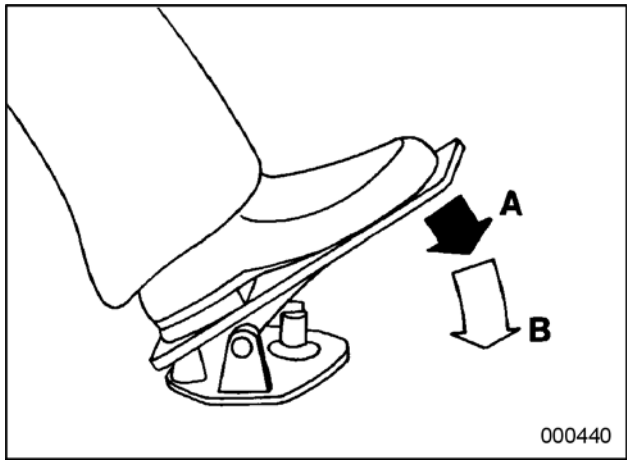
Automatic braking works with the control lever in the "0" position and at a vehicle speed of over 30 km/h only.

Service brakes

Messages on multifunctional display

Symbol	Message
	Brake-pad wear • Symbol lights, each time you depress the brake pedal: brake pads worn to almost minimum thickness. • Symbol continuously lighted: brake pads worn to minimum thickness.

Figure: brake pedal



Pedal travel A: retarder operation
Pedal travel B: retarder and compressed-air brakes operation

Brake-pedal resistance point

This is the brake pedal position in which you clearly start feeling higher resistance.

Braking

If you...	then...
depress the service brake pedal beyond the point of resistance,	the brake pads will be pressed against the brake discs by means of compressed air.

continued on next page

WARNING!

Wet brakes function less efficiently. If your vehicle has just been washed or you have been driving through puddles, dry the brakes by activating them gently a few times while driving.

To drive with ABS

Purpose of ABS

ABS prevents wheel locking during an emergency stop or during braking on a slippery road. This way the system helps to maintain steering stability. You can simultaneously fully depress the brake pedal and turn the steering wheel to avoid an unexpected obstacle.

Do not "pump" brake pedal in case of emergency

In order to benefit from the ABS equipment, do not "pump" the brake pedal on a slippery road, as you are used to, when driving a vehicle without ABS. Hold the brake pedal, once it is pressed down.

WARNING!

Having ABS on your vehicle should not tempt you to hazardous driving. Above all, do not brake later or harder. Do not count on a shorter stopping distance.

Message on multifunc-tional display

Symbol	Explanation
	If this symbol comes on during normal operation, the whole ABS system or part of it is defective. This symbol also comes on, when the ignition is switched on. It should extinguish after a few seconds, or when vehicle speed exceeds walking pace.

How to proceed in case of fault message

You may simply drive on. Still you should allow for higher skidding risk. In any case you should report the fault to the workshop personnel, as soon as you return.

Dashboard push-button

Push button	Function
	ABS/ASR system diagnosis

continued on next page

To call up ABS fault codes

At request, the lamp in the ABS diagnostic push-button on the dashboard shows memory contents through a flash code.

Step	Action
1	Switch on vehicle ignition.
2	Press and hold ABS diagnostic button for 1 second. The lamp in the ABS diagnostic push-button will flash.
3	Note number of flashes in order to determine fault code.

Fault code explanation

The fault code consists of two sets of consecutive flashes with each set separated by a 1.5 seconds pause. The fault codes themselves are separated individually by a 4 seconds pause.

Fault code example

Fault code 36 is rendered as follows:

- First set: three flashes
- Pause (approximately 1.5 second)
- Second set: six flashes
- Pause (4 seconds)

Fault code reproduction

The reproduction of fault codes is different for “active” and “stored” faults.

- Active fault: the lamp produces one fault code. This code will be repeated, until the ignition is switched off.
- Stored faults: the lamp produces the fault code for each stored fault, after that it stops flashing. The fault codes appear only once.

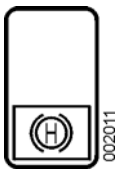
Bus-stop brake

Introduction

The bus-stop brake is an automatic brake. It operates on the same principle as the service brake, i.e. by supplying compressed air into the brake cylinders (but only into those of the drive axle).

Dashboard switch

NOTE: This switch is only present on vehicles for Germany.

Switch	Message
	To apply/release bus-stop brake

Dashboard indicator light

Light	Message
	Bus-stop brake on.

Automatic operation

NOTE: As long as the bus-stop brake is on, the accelerator pedal is disabled.

The bus-stop brake...	if you...
is applied, and the indicator light on the dashboard comes on,	open the rear passenger door.
is released	close the rear passenger door again.

To operate the bus-stop brake by means of the switch

Proceed as follows if you want to apply the bus-stop brake without opening the rear passenger door.

Step	Action
1	Wait until the vehicle has stopped completely.

continued on next page

Step	Action
2	Momentarily press the lower part of the bus-stop brake switch. The bus-stop brake indicator light on the dashboard will come on. *NOTE: If you press the bus-stop brake switch too early, a safety system delays the braking action until the vehicle has slowed to walking pace.* As long as the bus-stop brake is on, the accelerator pedal is disabled.
3	Press the upper part of the bus-stop brake switch to release the bus-stop brake again.

Parking brake

Parking brake operation

Each parking brake cylinder contains a powerful coil spring. Air pressure is used in this system to keep the springs "off", when the vehicle has to be driven. When operating the parking brake control lever, the parking brake cylinders are depressurised and the relieved springs will be able to apply the brake pads.

NOTE: If for some reason the pressure in the vehicle's air system is depleted, brake pads actuated by a parking brake cylinder remain applied.

Which axle has been equipped with parking brake cylinders?

In the case of...	the parking-brake cylinders are on the...
vehicles with 2 axles	drive axle.
vehicles with 3 axles	drive axle and the trailing axle.

Indicator light on dashboard

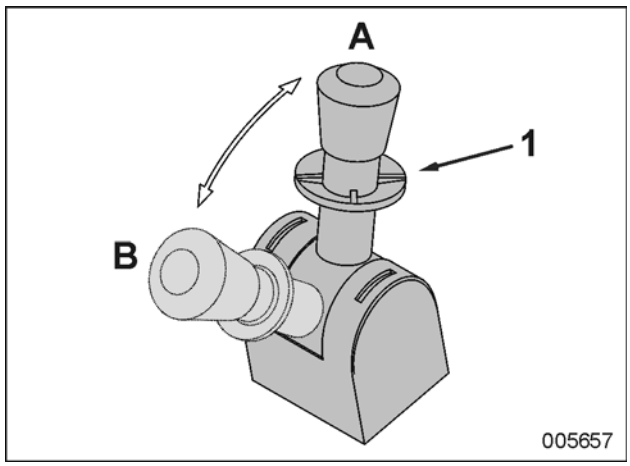
Light	Message
	Drive axle brakes applied by parking brake cylinders, regardless of the position of the parking brake lever.

Location of the parking brake lever

Refer to "Driver's cab lay-out".

continued on next page

Figure: parking-brake lever



A Parking brake off
B Parking brake on

When you leave the driver's cab

Apply the parking brake whenever you leave the driver's cab, even if only for a moment.

To apply parking brake

Tilt the parking brake handle downward until ring (1) locks.

To release parking brake

Lift locking ring (1) and simultaneously move the handle upward.

To release the brake gradually, e.g. in case of upward hill starts, move the lever slowly forwards.

Parking brake emergency release

Release by means of compressed air

In the case of pressure loss in the parking brake circuit, the parking brake will be engaged automatically. If this happens during service, you can still disengage the brake in order to clear the road. To do so, press the emergency release button. The brake is being released for as long as you press the button, even though the parking brake symbol remains on the multifunctional display. As soon as you release the button, the vehicle will be braked again.

For the location of the emergency button, refer to “Cab lay-out”.

NOTE: By pressing the emergency release button, you will be supplying the parking brake cylinders with air from the auxiliaries tank. The number of times you can engage and release the brake in this way is restricted: as soon as the air supply in the tank has been depleted, the emergency release button will no longer work.

WARNING!

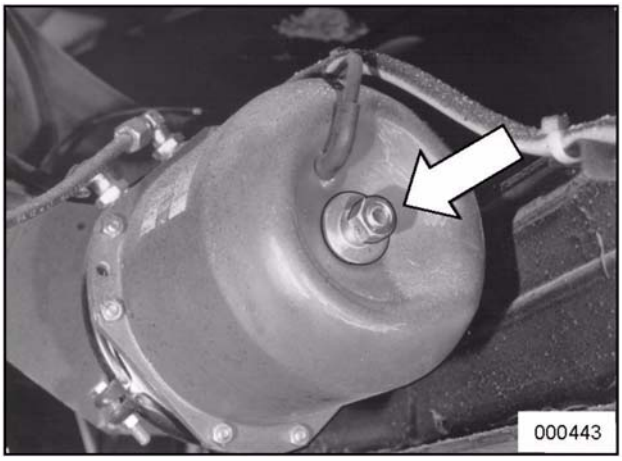
The actions mentioned in “Mechanical release” instantly release the parking brake, regardless of the position the parking brake handle is in. First put chocks in front of and behind the wheels in order to prevent the vehicle from rolling away.

Mechanical release

If a failure causes the compressed-air tanks to remain depleted, the vehicle is braked. In such case it is impossible to release the parking brake, neither with the parking brake handle nor with the emergency release valve. This situation calls for mechanical release of the brake, which will allow for your vehicle to be towed to the repair shop.

Step	Action
1	Put chocks in front of and behind wheels.

continued on next page

Step	Action
2	Using a 24 mm spanner loosen release bolt (see figure) on both drive axle brake cylinders as far as it will go. Untightening torque: 25 to 45 Nm. Drive axle wheels are now no longer braked. 
3	When you arrive at the repair shop, restore parking brake operation by screwing home bolts as far as they will go and tightening them to a torque of 30 to 36 Nm.

What to do, if power steering fails during service?

Power steering

With the engine running, hydraulic power steering enables you to turn the steering wheel with ease. If a defect causes steering assistance to fail, you can still steer, be it with more strength.

WARNING!

As power steering systems very rarely become defective, you might wrongly think that the steering system is blocked.

To move vehicle without steering assistance

If you have to move the vehicle with failing power steering, do so slowly; after all steering will be harder and slower. Equally, do not drive further than you absolutely need to.

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Chapter 6: In case of an emergency

Overview

Introduction

This chapter deals with the emergency facilities.

Number of pages

10

Chapter publication date

30 October 2007

Contents

Topic	See page
Central emergency switch	6-2
To open passenger door in the case of an emergency	6-3
Emergency exit through side windows	6-4
To use the roof hatch as an emergency exit	6-5
To mount roof hatch after actuation of emergency release handle	6-7
Fire extinguisher	6-9

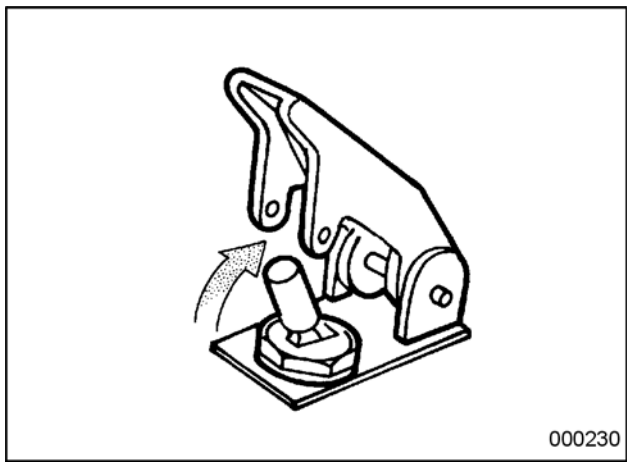
Central emergency switch

To be used when?

The emergency dashswitch is to be used in the case of danger (fire). This switch will at the same time switch off the engine and disconnect the batteries. The emergency switch comes with a safety cap.

NOTE: If you use the emergency switch, the memories of for example the radio and the clock will be erased.

Figure: emergency switch



WARNING!

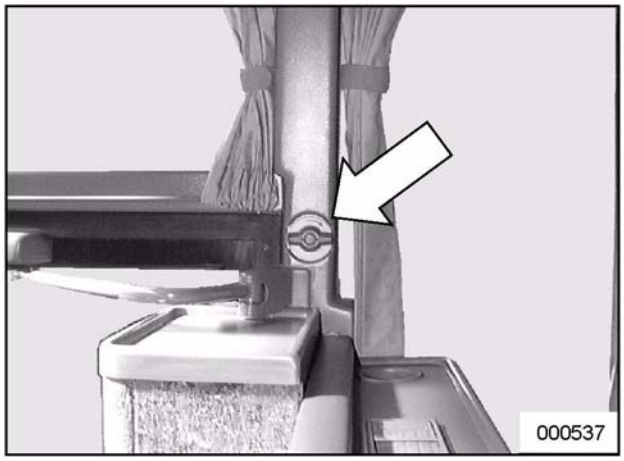
Accident hazard. Never activate central emergency switch, while vehicle is in motion. Various functions will be cut out: power steering, entire lighting (except for hazard warning light on versions built for some countries) and all electrically controlled functions such as windscreen wipers, gear change operation, retarder, ABS.

To open passenger door in the case of an emergency

Introduction

On the inside and the outside of the vehicle have been mounted emergency rotary handles in the vicinity of the doors. With these handles you can depressurise the passenger door actuating cylinders.

Figure: emergency handle



Emergency handle of front passenger door, on the inside

Procedure

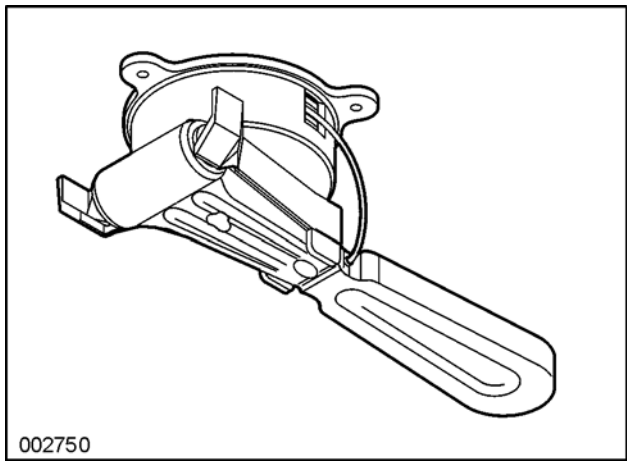
Step	Action
1	To depressurise door cylinder turn handle clockwise by a quarter turn.
2	Wait for the door to have sunk.
3	Pull open the door or push it open.

Emergency exit through side windows

Emergency hammer

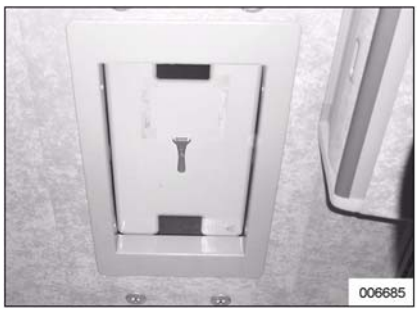
Near a number of side windows you will find a hammer you can shatter the glass pane with.

Figure: emergency hammer



To use the roof hatch as an emergency exit

Figure: types of roof hatches

Type 1 (manual)	
Type 2 (electric)	
Type 3 (electric)	

Procedure for types 1 and 2

Each roof hatch has a handle to open it in an emergency.

NOTE: The exterior emergency control does not operate when the roof hatches are locked.

continued on next page

Step	Action
1	Pull firmly on the emergency release handle. The hatch is unlocked.
2	Push out the roof hatch.

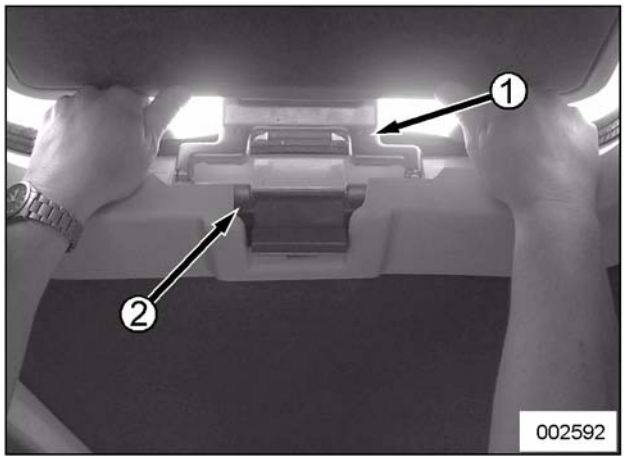
Procedure for type 3

Use the emergency hammer secured to the roof hatch to break the glass.

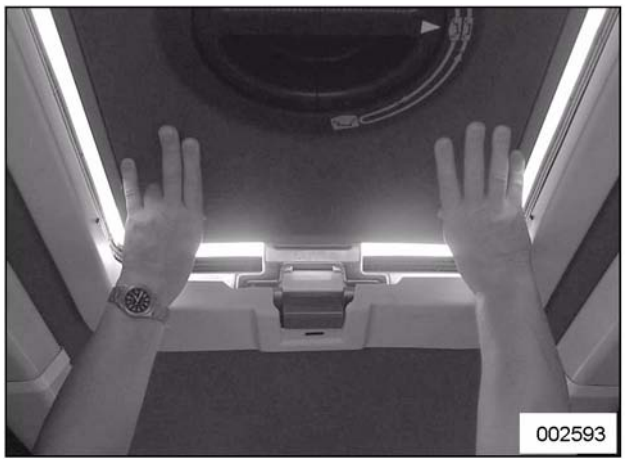
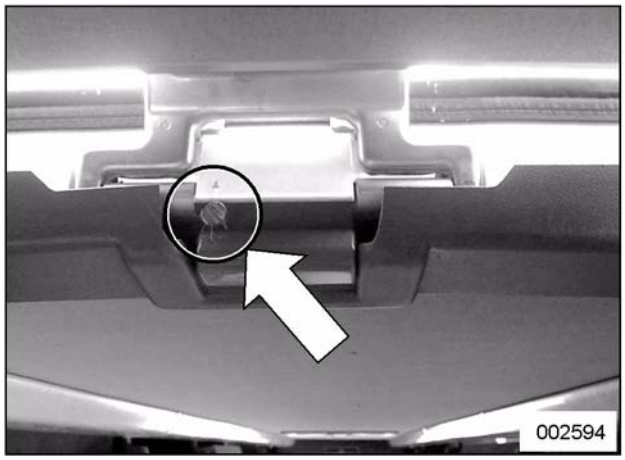
To mount roof hatch after actuation of emergency release handle

Procedure

NOTE: Only for roof hatch types 1 and 2 (for an overview of the types of hatches, refer to "To use the roof hatch as an emergency exit" in the present chapter)

Step	Action
1	Put the roof-hatch mechanism in the "front and back open" position.
2	Pull the emergency release handle inside the vehicle completely to the rear.
3	Align the holes of hinge arm (1) with the locking pins of support (2). Repeat this for the other hinge arm. 
4	Push the inside emergency release handle to the front. The locking pins now slide into the holes of the hinge arms. *NOTE: In case of the front hinge arm, it might be necessary to manually move it slightly to the front or to the rear before it will lock.*

continued on next page

Step	Action
5	Push at the front and at the rear of the roof hatch to check if the hinge arms are locked properly. 
6	Fit a lead seal to the emergency release handle. 

Fire extinguisher

Number and location of fire extinguishers

Country	Vehicle type	Number/location
Belgium/ Luxembourg	Single-decker	• one with the driver • one in the passengers compartment
	Double-decker	• one with the driver • one in the passengers compartment lower deck • one in the passengers compartment upper deck
Netherlands	Single-decker	one with the driver
	Double-decker	• one with the driver • one in the passengers compartment upper deck
France	Single-decker	one with the driver
	Double-decker	• one with the driver • one in the passengers compartment upper deck
Germany	Single-decker	one with the driver
	Double-decker	• one with the driver • one in the passengers compartment upper deck
Spain	Single-decker	one with the driver
	Double-decker	• one with the driver • one in the passengers compartment upper deck

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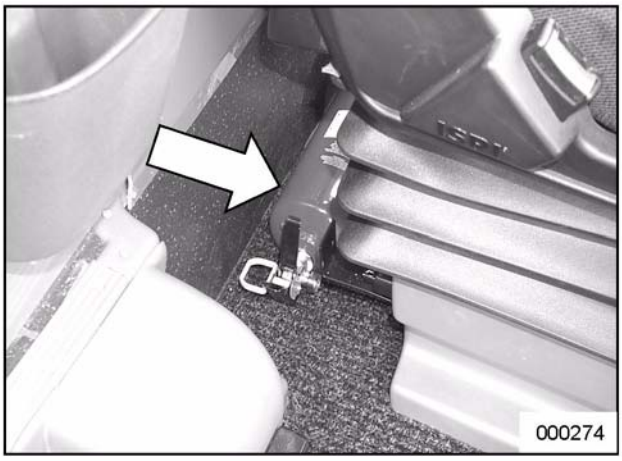
Figure: fire extinguisher behind driver's seat



Chapter 7: On-the-road emergency repairs

Overview

Introduction

This chapter deals with the on-the-road emergency repairs.

Number of pages

28

Chapter publication date

30 October 2007

Contents

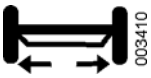
Topic	See page
To read the ECU fault memories through the multifunctional display on the dashboard	7-2
Emergency operation of automatic shut-off valves in fuel supply	7-7
Fan clutch, how to proceed in case of breakdown	7-9
Emergency operation of raising/lowering system	7-11
Interior heating circuit main isolating valves	7-12
Emergency operation of power-operated luggage compartment doors	7-13
Emergency operation of luggage compartment doors central locking system	7-15
Jump starting instructions	7-16
Lifting instructions	7-18
Towing instructions	7-20
To fill compressed-air tanks from an external source	7-21
Spare wheel	7-22
To change wheel on-the-road	7-24

To read the ECU fault memories through the multifunctional display on the dashboard

Introduction

The electronic control units (ECUs) store the detected failures in their fault memory. In case of "DM1-DM4" supporting ECUs (see below), you can read the fault memory through the multifunctional display on the dashboard.

Overview of "DM1-DM4" supporting ECUs

Symbol	Explanation
	Engine: control unit
	Engine: main vehicle processor (only MAN engine)
	Engine: exhaust aftertreatment (only DAF engine)
	Gearbox
	Retarder
	Trailing axle steering (only on coaches with steered trailing axle)

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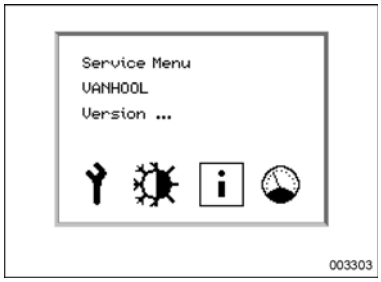
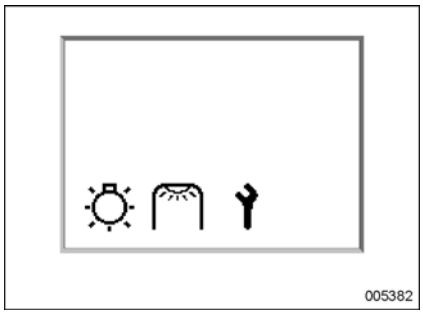
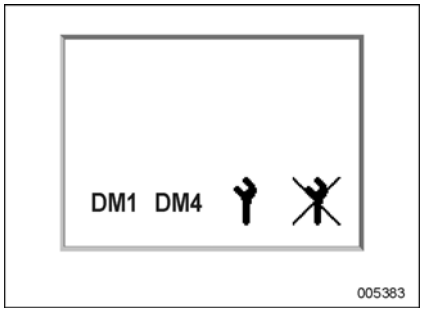
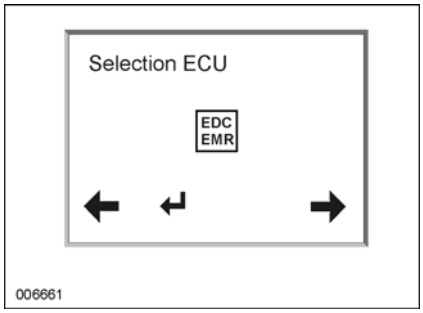
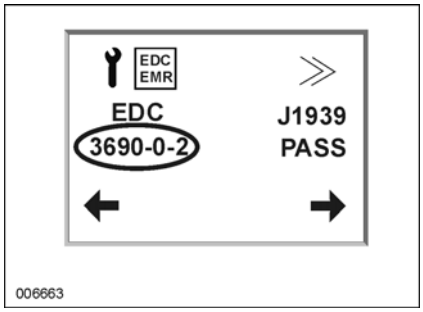
To read the stored faults (DM4)

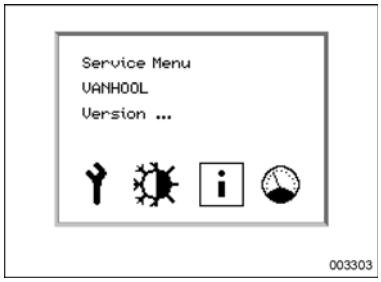
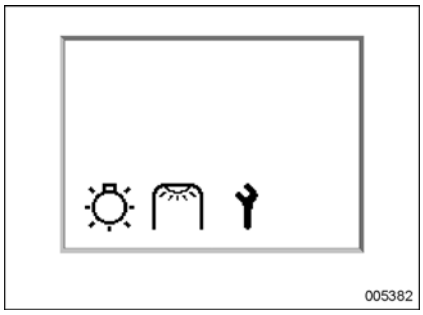
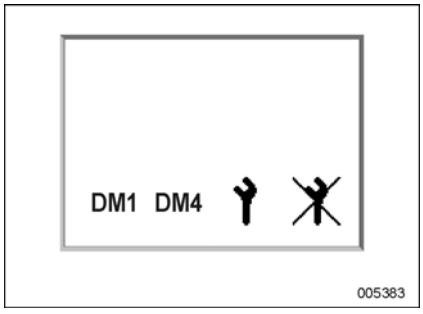
Step	Operation	Result
1	Press and hold the outer left button under the display for more than 5 seconds.	The service menu appears on the display. 
2	Press the button under the spanner symbol.	The on-board diagnostics menu appears on the display. 
3	Press the button under the spanner symbol.	The menu below appears on the display. 
4	Press the button under "DM4".	

continued on next page

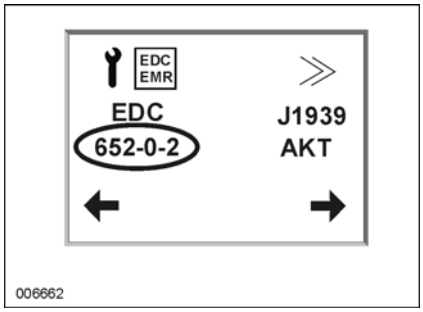
Step	Operation	Result
5	By means of the buttons under the arrows (not the angled arrow), browse through the ECUs until the required symbol appears ("EDC/EMR", for example).	
6	Press the button under the angled arrow.	• On the display, only the spanner symbol appears: there are no stored faults in the selected ECU. • The display shows the fault code of the stored failure. Example: 3690-0-2.  *NOTE: The presence of multiple faults is indicated by the ">>" symbol. In that case, use the buttons under the arrows to browse the fault memory.*

continued on next page

To read the active faults (DM1)

Step	Operation	Result
1	Press and hold the outer left button under the display for more than 5 seconds.	The service menu appears on the display. 
2	Press the button under the spanner symbol.	The on-board diagnostics menu appears on the display. 
3	Press the button under the spanner symbol.	The menu below appears on the display. 

continued on next page

Step	Operation	Result
4	Press the button under "DM1".	• On the display, only the spanner symbol appears: there are no active faults in the "DM1-DM4" supported ECUs. • A fault code appears on the display. Example: active fault 652-0-2 of EDC.  *NOTE: The presence of multiple faults is indicated by the ">>" symbol. In that case, use the buttons under the arrows to browse the ECUs.*

To exit diagnostics menu

Press the outer left button under the multifunctional display as many times as needed to return to the service menu.

Emergency operation of automatic shut-off valves in fuel supply

Introduction

For the sake of safety the fuel system has been equipped with two automatic solenoid shut-off valves: one in the supply line to the engine and one in the supply line to the coolant heater.

Location of shut-off valves

For the location of the shut-off valves, refer to “Access doors and controls on the outside”.

Emergency operation of shut-off valves

The shut-off valve does not just close, when the safety feature becomes operative, but also unintended, in case a solenoid has become defective or its electrical circuit is interrupted. In that case the engine is out of service. In order to restore the fuel supply in that case, the shut-off valve has been equipped with an emergency lever.

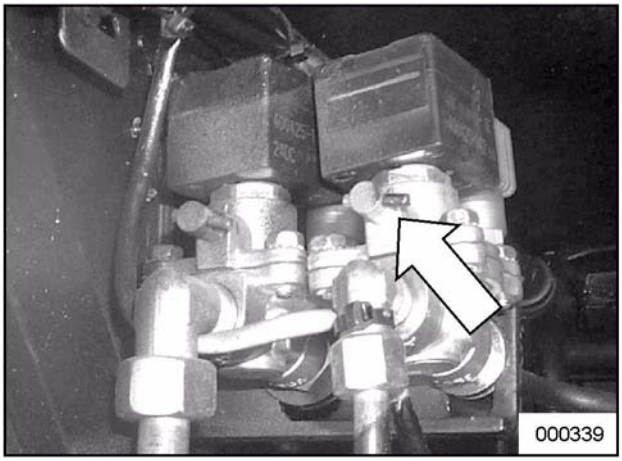
To ... the shut-off valve	you have to...
open	push the lever and turn it slightly further than a quarter turn clockwise.
reclose	turn the lever slightly further than a quarter turn counterclockwise.

WARNING!

The emergency operation procedure for the shut-off valves must be used in the case of a failure only. The use of the emergency operation mode is just a temporary solution. The defect has to be repaired as soon as possible.

continued on next page

Figure: emergency lever on fuel shut-off valve



Fan clutch, how to proceed in case of breakdown

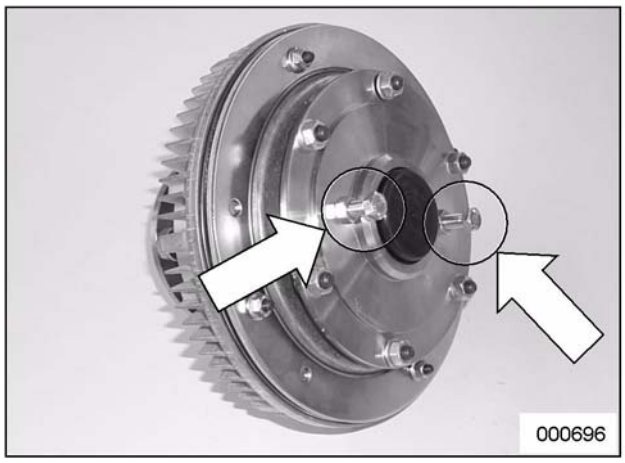
Fan clutch defective?

If the fan runs significantly slower than its driving pulley, whereas coolant temperature is rising considerably, this is an indication of a defective electro-magnetic fan clutch.

Action required

You can try driving on, but with less throttle. If reduced throttle is insufficient to keep temperature beneath the maximum allowable value, you will have to lock the fan to its drive.

How to lock the fan clutch

Step	Action
1	Stop the engine.
2	**WARNING!** **Take precautions to prevent the engine from being started from the cab.** Using a 13 mm wrench loosen the locknuts of both locking screws. The lock screws are located on the fan clutch front end. 
3	Screw home both locking screws, until you can no longer turn the fan by hand (tightening torque: 25 Nm). *NOTE: Use both screws, in order to have each screw bear half of the load.*
4	Tighten the locknuts of the locking screws.

continued on next page

Restricted use

Locking the fan clutch is an emergency solution, the use of which must not be prolonged. The clutch system should be repaired at the earliest opportunity.

Emergency operation of raising/lowering system

Button for emergency operation

If the dashswitch is not working, you can raise/lower the body by pressing the button on the raising/lowering system control valves. This emergency operation works with the engine stopped also.

For the location of the control valves, refer to “Access doors and controls on the outside”.

To raise from ride position

To...	press...
raise	raising control valve button momentarily.
return to normal ride height	raising control valve button momentarily once more.

To lower from ride position

To...	press...
lower	lowering control valve button momentarily.
return to normal ride height	lowering control valve button momentarily once more.

Interior heating circuit main isolating valves

Purpose of main isolating valves

The water pipes have two main isolating valves. The valves allow for the engine cooling system to be isolated completely from the heating system, if required.

Position of main isolating valves

For the location of the main isolating valves, refer to “Access doors and controls on the outside”.

CAUTION!

With the main isolating valves closed you can drive the vehicle, but the heating system must not be switched on.

To close main isolating valves

Step	Action
1	Turn isolating valve handle in interior heating supply line clockwise, until handle is perpendicular to pipe.
2	Turn isolating valve handle in interior heating return line clockwise, until handle is perpendicular to pipe.

To open main isolating valves

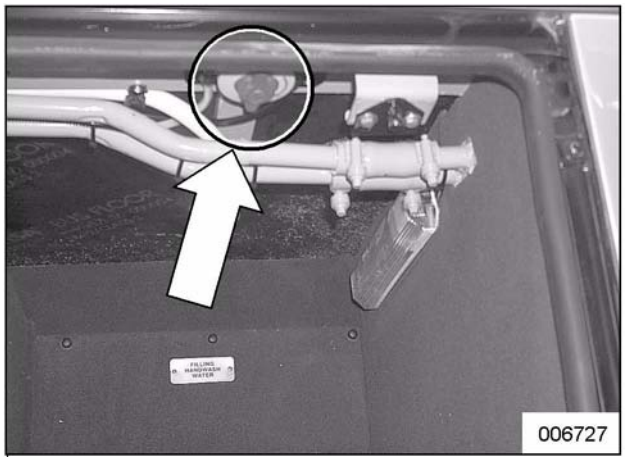
Step	Action
1	Turn isolating valve handle in interior heating supply line counter-clockwise, until handle is parallel to pipe.
2	Turn isolating valve handle in interior heating return line counter-clockwise, until handle is parallel to pipe.

Emergency operation of power-operated luggage compartment doors

Introduction

Should the dashboard switch fail to operate, you can depressurise the compressed-air circuit of the power-operated luggage compartment doors using an emergency handle. This then allows you to open and close the luggage compartment doors manually.

Figure: emergency handle of power-operated luggage compartment doors



Location of emergency release handles

NOTE: If there are power-operated luggage compartment doors on the LH side as well as on the RH side of the vehicle, two handles have been installed.

The emergency handle for the ...	is located ...
left luggage compartment doors	behind the exterior door forward of the left front wheel.
right luggage compartment doors	behind the exterior door forward of the right front wheel.

To open the luggage compartment door

Step	Action
1	Turn the handle a quarter turn clockwise to release the air-pressure from the compressed-air cylinders.
2	Open the luggage compartment door manually.

continued on next page

To close the luggage compartment door

Step	Action
1	Close the luggage compartment door manually.
2	Turn the handle a quarter turn anti-clockwise to re-admit air to the compressed-air cylinders.

Emergency operation of luggage compartment doors central locking system

Button for emergency operation

If the dashswitch is not working, you can still control the central locking system by means of a button on the system control valve.

For the location of the control valve, refer to “Access doors and controls on the outside”.

Procedure

To ... luggage compartment doors	press...
lock	control valve button.
unlock	control valve button a second time.

Jump starting instructions

WARNING!

Before jump starting through another vehicle, check whether the other vehicle has a negative ground 24-volt electrical system. Also check, whether the batteries of this vehicle have sufficient capacity. Do not jump start, unless both of these conditions have been met. This is necessary in order to prevent injuries as well as material damage.

CAUTION!

First check fluid level of all batteries. If necessary, top up.

CAUTION!

Use jumper cables with a minimum cross-section size of 70 mm^2.

Before connecting jumper cables

First:

- apply parking brake;
- put gearbox in neutral;
- stop engine;
- switch off all power consumers;
- switch off vehicle ignition;
- switch off master switch.

NOTE: If jump starting involves the assistance of a host vehicle, these instructions apply to both vehicles.

WARNING!

Do not attach jumper cable to pipes or moving parts.

continued on next page

WARNING!

Do not lean over batteries (not during starting either).

To connect jumper cables

Step	Action
1	Connect first jumper cable between positive terminal on depleted battery set and positive terminal on host battery set (positive terminals have been marked with “+” or red plastic collar).
2	Connect one end of second jumper cable to negative terminal (marked with “-“ or either blue or green plastic collar) of host battery set.
3	**WARNING!** **Never connect other cable end directly to negative terminal of depleted battery set.** Clamp other end of negative cable to chassis frame or body of vehicle requiring jump starting. Ensure good electrical contact.
4	Start engine of vehicle requiring assistance.
5	Have engine idle for a few minutes so that both battery sets can acquire equal voltage. This will reduce the formation of sparks, when you disconnect jumper cables.

To disconnect jumper cables

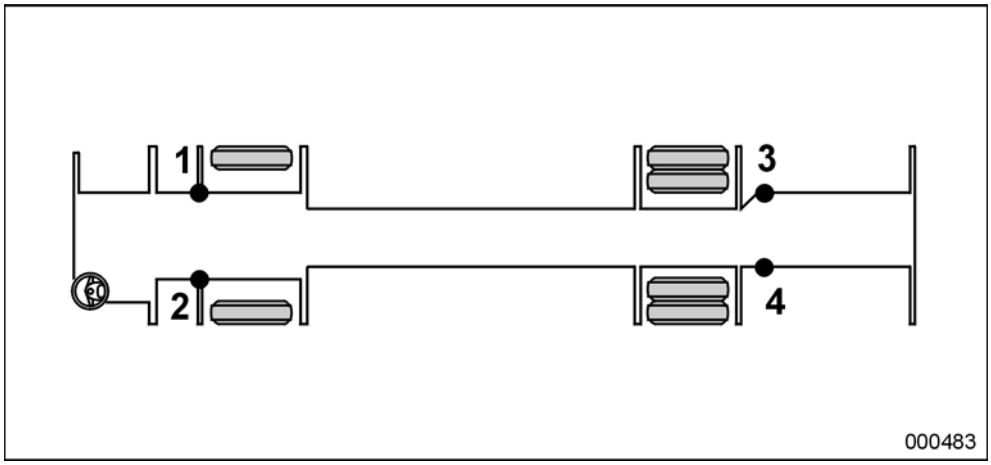
Step	Action
1	Disconnect negative jumper cable from chassis frame or vehicle body.
2	Disconnect other end of negative cable from batteries.
3	Remove positive jumper cable.

Lifting instructions

To lift under chassis frame

- If the vehicle has to be lifted under the chassis frame, locate the jack ram heads under the points indicated in the figure only.
- Always lift vehicle by both front and/or rear jacking points simultaneously.
- Equally, when placing support stands (for example when you use mobile column lifts to lift the vehicle), do not use any other points than the ones mentioned above.
- Not observing these rules can cause serious damage to chassis sections.

Figure: jacking points on chassis frame



To lift under rear axle

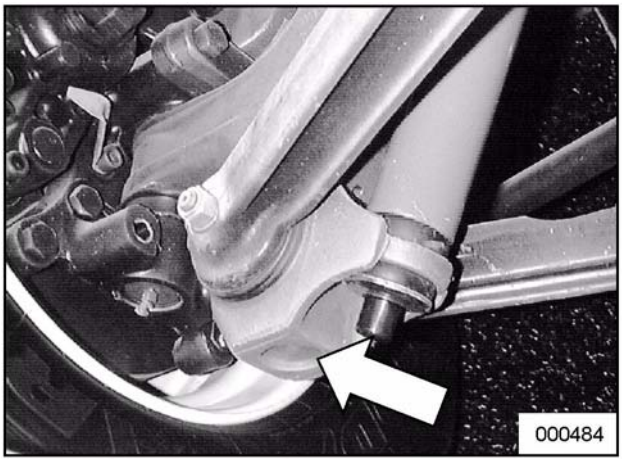
If the rear axle has to be lifted, the best way to proceed is to place a central jack with a dished lifting pad under the middle of the axle banjo.

To lift under front axle

If you have to lift an axle end of the front suspension, put the jack in the recess of the stub axle carrier indicated in the figure.

continued on next page

Figure: jack recess in stub axle carrier



Position jack here, to lift an axle end of the front suspension

Towing instructions

Guidelines

- Always disconnect drive shaft at rear axle or remove both rear axle half shafts before towing. In the case of damage within the rear axle the vehicle has to be suspended at the rear.
- Threaded bushes have been fitted at the left in the front bumper and at the right in the rear bumper. They have been designed to accept the towing fork which is supplied with the onboard tool kit.
- During towing, pressure in the vehicle's compressed-air system can be maintained by an air line from the towing vehicle to the fill connection shown in "To fill compressed-air tanks from an external source".

To fill compressed-air tanks from an external source

CAUTION!

Fill with clean, dry air only. Moreover, air pressure must not exceed 9 bar.

Fill connection

For the location of the fill connection, refer to "Access doors and controls on the outside".

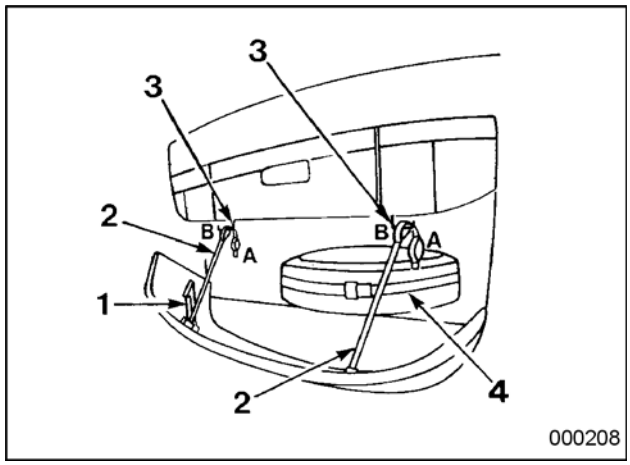
The fill connection allows the entire vehicle's compressed-air system to be pressurised from an external source, if necessary.

Spare wheel

Location of spare wheel

The spare wheel is located behind the reclining front bumper.

Figure: spare wheel compartment



1 Safety latch
2 Front bumper securing belt
3 Hook
4 Spare wheel securing belt

Location of front bumper release knob

Refer to “Access doors and controls on the outside”.

To take out spare wheel

Step	Action
1	Pull front bumper release knob. Front bumper now emerges partly.
2	Push back inside front bumper a little and push down safety latch (1).
3	Slowly lower bumper, until it is supported by securing belts. *NOTE: In order to take out spare wheel, front bumper securing belts have to be attached to hooks (3) by loops (A).*
4	Loosen spare wheel securing belt and pull out sledge with spare wheels.

continued on next page

To stow away defective wheel

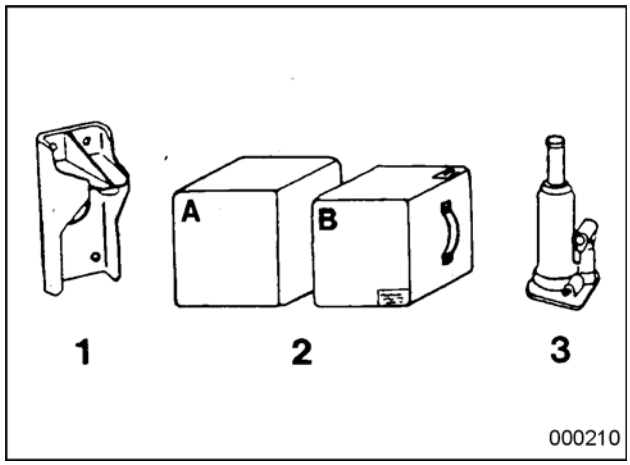
Proceed in reversed order to stow away defective wheel. To latch front bumper swing it up and press firmly (double latch).

To change wheel on-the-road

General guidelines for changing a wheel

- Have all passengers disembark;
- Place vehicle on a level, hard surface;
- Apply parking brake;
- Chock road wheels that will remain on the ground;
- Use hydraulic jack that comes with vehicle only.

Figure: jacking tool



Tool to change front and trailing axle wheel

1 Lifting bracket
2 Set of wooden blocks
A Jack supporting block
B Stub axle carrier supporting-block
3 Hydraulic jack

Lifting bracket

With the on-board tool kit comes a lifting bracket. This bracket is mounted on the wheel nut bolts; the front of the bracket then serves as a support for the jack.

Fixing nuts for lifting bracket

Four nuts are required to fix the lifting bracket to the wheel.

In the case of wheel rims made out of...,	fix lifting bracket with...
steel	ordinary M22 x 1.5 nuts.

continued on next page

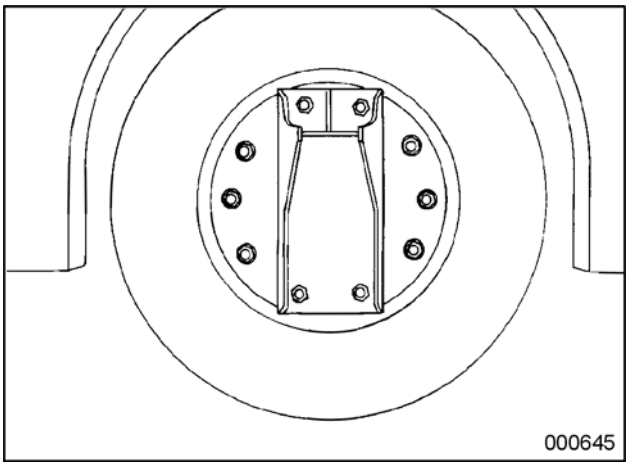
In the case of wheel rims made out of...,	fix lifting bracket with...
light-alloy	special nuts, Van Hool ordering number 10627683 (on-board tool kit)

WARNING!

Do not use wheel nuts to fix lifting bracket.

To change flat tyre on front and trailing axle

NOTE: The wheel nuts are loosened, when turned counterclockwise and tightened, when turned clockwise.

Step	Action
1	Remove hub cover.
2	Remove four wheel nuts.
3	Fix lifting bracket on free wheel bolts.
4	**WARNING!** **If the jack deviates slightly from vertical position, it will be aligned automatically after the first strokes of the jack. If, however, the bracket is misaligned considerably, you risk that the jack will slip away during the lifting process.** Move vehicle, until lifting bracket is in perpendicular position. 
5	Chock wheels to prevent vehicle from rolling away.

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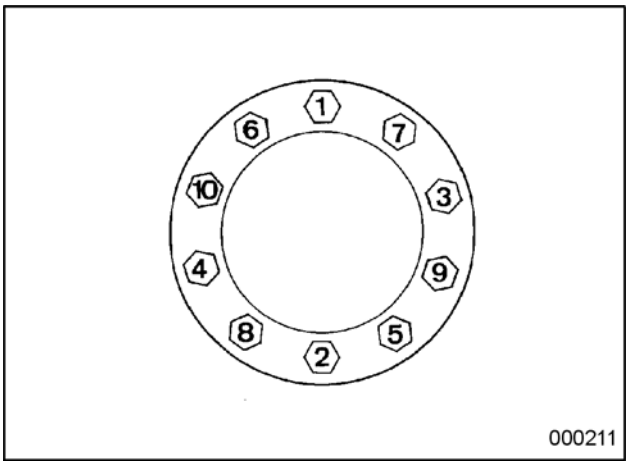
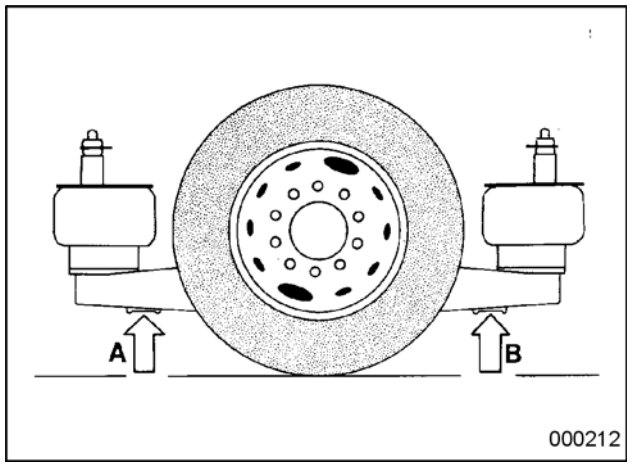
Step	Action
6	Slide supporting block (A) under lifting bracket. Put jack on supporting block (A) and jack up wheel, until block (B) can be introduced underneath stub axle carrier. • In the case of the front axle the tag saying “THIS SIDE UP FOR FRONT AXLE” on block (B) has to face upwards. • In the case of the trailing axle the tag saying “THIS SIDE UP FOR TRAILING AXLE” on block (B) has to face upwards. Leave a space of approximately 5 cm between block (B) and flat tyre sidewall. This will facilitate spare wheel mounting later on.
7	Lower stub axle carrier onto block (B).
8	Remove lifting bracket and take off wheel having flat tyre.
9	Clean contacting surfaces of spare wheel, hub and wheel nuts. Clean wheel bolts threads.
10	Install spare wheel. Tighten wheel nuts firmly.
11	Repeat jacking procedure, in reversed order. Remove supporting blocks.
12	Tighten wheel nuts evenly by alternately turning every nut progressively further each time, until torque of 600 ± 20 Nm is reached. Tightening sequence: see figure. 
13	Inflate tyre to correct pressure.

To retighten wheel nuts

Retighten wheel nuts to a torque of 600 ± 20 Nm after 50 km of service and again after another 100 km. After that check torque daily, until nuts are finally tight.

continued on next page

Figure: jacking points on drive axle suspension beam



To change drive axle wheel

The following procedure is applicable, if only one tyre of the twin wheels is flat.

NOTE: The wheel nuts are loosened, when turned counterclockwise and tightened, when turned clockwise.

Step	Action
1	Loosen wheel nuts.
2	Position jack under C-shaped suspension beam jacking point rearward of wheel, at side of flat tyre.
3	Jack up suspension beam, until both twin wheels clear ground. Slide supporting block under drive-axle body. Lower suspension beam, until drive axle rests on supporting block.
4	Remove wheel having flat tyre.
5	Perform items 9,10,11,12,13 mentioned in “To change flat tyre on front and trailing axle”. Make sure tyre valve of inner wheel can be reached through holes of outer wheel.

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Chapter 9: Vehicle data

Overview

Introduction

This chapter deals with the vehicle data.

Number of pages

14

Chapter publication date

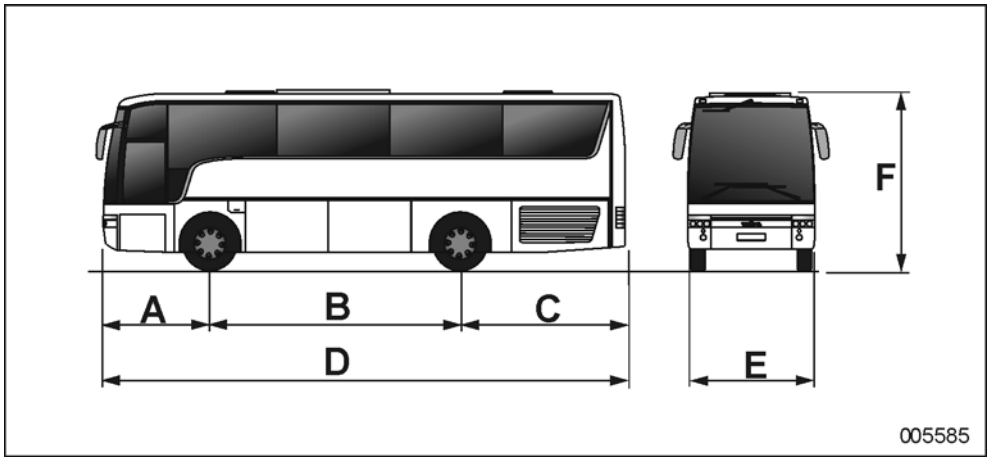
9 April 2009

Contents

Topic	See page
Vehicle technical data T911 Alicron	9-2
Vehicle technical data T915 Alicron/Acron	9-5
Vehicle technical data T916 Alicron	9-8
Fluids and lubricants	9-10

Vehicle technical data T911 Alicron

Figure: vehicle dimensions



Dimensions

Letter in figure	Explanation	Dimension
A	Front overhang	2,12 m
B	Wheel base	5,05 m
C	Rear overhang	3,33 m
D	Overall length	10,5 m
E	Overall width	2,55 m
F	Overall height	3,47 m
-	Interior height	2,03 m

Engine

Make	MAN
Type	• D2066 LOH 02 (Euro 4) • D2066 LOH 03 (Euro 4) • D2066 LOH 04 (Euro 4) • D2066 LOH 06 (Euro 4 + lambda probe) • D2066 LOH 07 (Euro 4 + lambda probe) • D2066 LOH 08 (Euro 4 + lambda probe)

continued on next page

Maximum power	• D2066 LOH 02/06: 265 kW at 1 900 rpm • D2066 LOH 03/07: 294 kW at 1 900 rpm • D2066 LOH 04/08: 324 kW at 1 900 rpm
Maximum torque	• D2066 LOH 02/06: 1 800 Nm from 1 000 to 1 400 rpm • D2066 LOH 03/07: 1 900 Nm from 1 000 to 1 400 rpm • D2066 LOH 04/08: 2 100 Nm from 1 000 to 1 400 rpm

Gearbox

Make	DaimlerChrysler
Type	GO210

Brakes

Make	Knorr-Bremse
Type	Disk brakes SN7...

Retarder

Make	Voith
Type	R115E

Front axle

Make	Van Hool
Type	Independent wheel suspension

Drive axle

Make	Dana
Type	G171

Tyres (standard)

Make	Michelin
Type	295/80 R22.5 Energy XZA2
Load index	152/148
Speed index	L

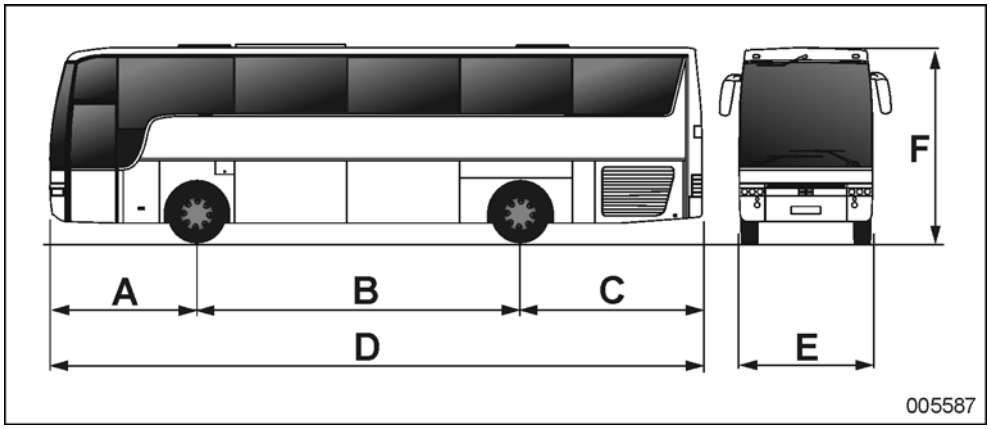
continued on next page

Tyre inflation pressure

Front axle	7,75 + 0,5 bar
Drive axle	7,75 + 0,5 bar

Vehicle technical data T915 Alicron/Acron

Figure: vehicle dimensions



The figure shows a T915 Acron

Dimensions of Acron and Alicron models

Letter in figure	Explanation	Dimension
A	Front overhang	2,74 m
B	Wheel base	5,91 m
C	Rear overhang	3,55 m
D	Overall length	12,2 m
E	Overall width	2,55 m
F	Overall height	• Acron: 3,6 m • Alicron: 3,47 m
-	Interior height	2,03 m

Engine

Make	MAN
Type	• D2066 LOH 02 (Euro 4) • D2066 LOH 03 (Euro 4) • D2066 LOH 04 (Euro 4) • D2066 LOH 06 (Euro 4 + lambda probe) • D2066 LOH 07 (Euro 4 + lambda probe) • D2066 LOH 08 (Euro 4 + lambda probe)

continued on next page

Maximum power	• D2066 LOH 02/06: 265 kW at 1 900 rpm • D2066 LOH 03/07: 294 kW at 1 900 rpm • D2066 LOH 04/08: 324 kW at 1 900 rpm
Maximum torque	• D2066 LOH 02/06: 1 800 Nm from 1 000 to 1 400 rpm • D2066 LOH 03/07: 1 900 Nm from 1 000 to 1 400 rpm • D2066 LOH 04/08: 2 100 Nm from 1 000 to 1 400 rpm

Gearbox

Make	DaimlerChrysler
Type	GO210

Brakes

Make	Knorr-Bremse
Type	Disk brakes SN7...

Retarder

Make	Voith
Type	R115E

Front axle

Make	Van Hool
Type	Independent wheel suspension

Drive axle

Make	Dana
Type	G171

Tyres (standard)

Make	Michelin
Type	295/80 R22.5 Energy XZA2
Load index	152/148
Speed index	L

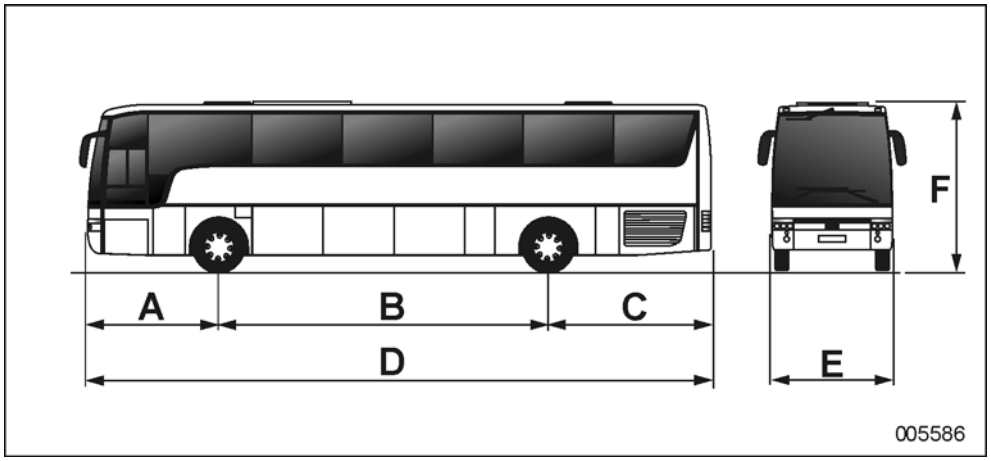
continued on next page

Tyre inflation pressure

Front axle	7,75 + 0,5 bar
Drive axle	8,5 + 0,5 bar

Vehicle technical data T916 Alicron

Figure: vehicle dimensions



Dimensions

Letter in figure	Explanation	Dimension
A	Front overhang	2,74 m
B	Wheel base	6,76 m
C	Rear overhang	3,35 m
D	Overall length	12,85 m
E	Overall width	2,55 m
F	Overall height	3,47 m
-	Interior height	2,03 m

Engine

Make	MAN
Type	• D2066 LOH 02 (Euro 4) • D2066 LOH 03 (Euro 4) • D2066 LOH 04 (Euro 4) • D2066 LOH 06 (Euro 4 + lambda probe) • D2066 LOH 07 (Euro 4 + lambda probe) • D2066 LOH 08 (Euro 4 + lambda probe)
Maximum power	• D2066 LOH 02/06: 265 kW at 1 900 rpm • D2066 LOH 03/07: 294 kW at 1 900 rpm • D2066 LOH 04/08: 324 kW at 1 900 rpm

continued on next page

Maximum torque	• D2066 LOH 02/06: 1 800 Nm from 1 000 to 1 400 rpm • D2066 LOH 03/07: 1 900 Nm from 1 000 to 1 400 rpm • D2066 LOH 04/08: 2 100 Nm from 1 000 to 1 400 rpm

Gearbox

Make	DaimlerChrysler
Type	GO210

Brakes

Make	Knorr-Bremse
Type	Disk brakes SN7...

Retarder

Make	Voith
Type	R115E

Front axle

Make	Van Hool
Type	Independent wheel suspension

Drive axle

Make	Dana
Type	G171

Tyres (standard)

Make	Michelin
Type	295/80 R22.5 Energy XZA2
Load index	152/148
Speed index	L

Tyre inflation pressure

Front axle	8,0 + 0,5 bar
Drive axle	8,5 + 0,5 bar

Fluids and lubricants

Approved fluids and lubricants

On the website "www.vanhool.be" under the menu item "service", you can click hyperlinks for access to lists of approved fluids and lubricants published on the websites of MAN, ZF and Voith.

Fuel tank

Capacity	Specifications
Depending on version	Diesel fuel[a] which meets EN 590 standard, low sulphur[b], with additives for improved lubricity[c], and with detergent additives[d]

a. If possible without silicon based anti-foaming agents

b. Less than 50 ppm of sulphur

c. Minimum requirements: refer to EN 590. Ask for a written statement of your fuel supplier.

d. To prevent clogging of the injectors (due to lubricating additives), low sulphur or sulphur-free fuels have to contain cleaning additives in sufficient quantity. Ask your fuel supplier for a written statement.

MAN recommends fuels with detergent additives that obtain the following results for cleanliness of injectors after test CEC F-23-A-01 in test engine XUD-9:

Flow reduction: less than 70 %

Remaining flow: more than 30%

CAUTION!

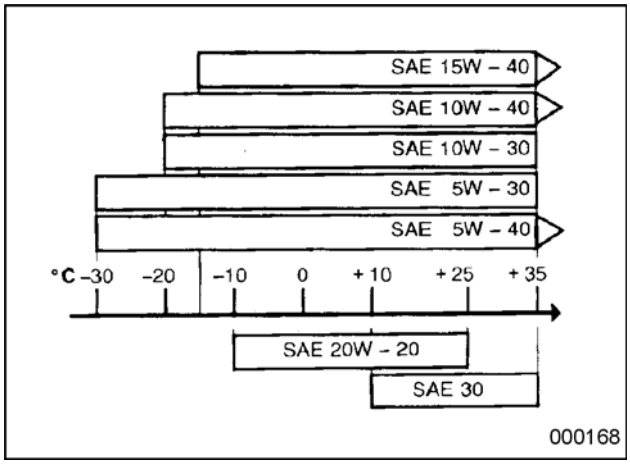
It is not allowed to use pure vegetable oil as an engine fuel, nor must it be mixed with the engine fuel. The same applies to all so-called "alternative fuels" which do not comply with the EN 590 standard.

CAUTION!

For engines with common-rail injection, MAN does not yet allow the use of FAME (biodiesel) as fuel.

continued on next page

Engine sump (oil filter included)

Capacity	Specifications
• Maximum level: approx. 42 litres • Minimum level: approx. 36 litres	Engine oil meeting MAN standard M3477.  Viscosity requirements relative to ambient temperature.

Clutch operating system

Capacity	Specifications
approx. 1,5 litres	Hydraulic brake fluid meeting FMVSS 116 DOT 3. Boiling point at least 260 °C

Gearbox

Type	Capacity	Specifications
DaimlerChrysler GO... • Oil change • Initial fill	 approx. 12,5 litres approx. 13 litres	• Daimler Chrysler MB 235.11 gearbox oil A0019892803 • Burmah Veedol Synmesh-AT • Burmah Castrol Syntrans-AT • DEA Deagear Synth

VOITH R115E retarder

Capacity	Specifications
approx. 7 litres	Oil to VOITH retarder lubricants list

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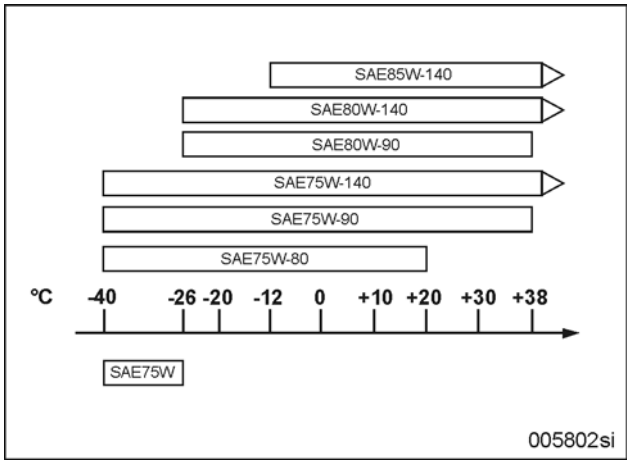
Drive axle

Capacity	Specifications
approx. 17 litres	Gear oil meeting MIL-L-2105D.  Viscosity requirements relative to ambient temperature. *NOTE: The drive axle has been factory filled with SAE 85W-140 mineral oil.*

Power steering

Capacity	Specifications
approx. 9 litres	Automatic transmission fluid to ZF lubricants list TE-ML 09.

Engine cooling and interior-heating systems

CAUTION!

The use of antifreeze with "organic" corrosion inhibitors (so-called O.A.T.) is not permitted. This type of antifreeze attacks blue silicon hoses.

Capacity	Specifications
Depending on version	Year round a mixture[a] of water[b] and one of the following antifreezes: • BASF Glysantin G 48 (factory filling) • BP-ARAL Aral Antifreeze Extra • MOBIL Mobil Antifreeze Extra

continued on next page

a. Preferably fill with a fully formulated mixture of water and antifreeze.

b. If you mix antifreeze with water yourself, prepare this mixture beforehand and only use deionised or demineralised water.

Interior-cooling system

R134a refrigerant

Climate-control compressor sump

Capacity	Specifications
approx. 2 litres	Refrigerating compressor oil FUCHS Reniso Triton SE 55

Greasing points

Application	Specifications
All lubricators on chassis and body, unless otherwise stated	Multipurpose grease: NLGI No 2 grade, lithium based, with EP and anti-corrosion additives, drop point not below 190°C
Propeller shaft	Special high temperature grease: • SHELL Retinax LX 2 • FUCHS Renolit Duraplex GWB • RHENUS Norplex LKP 2
Front axle: kingpin bearings	FUCHS Renolit LX-OTP 2
Door pillar of automatic passenger door(s)	NLGI No. 2 grade high-temperature grease with molybdenum disulphide (MoS_2)
Splash water protection cover on steering box output shaft	Special grease: TEXACO Texando FO 20

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Alphabetical index

A

About this manual ..... 0 - 2

ABS
Operation ..... 5 - 37

Access doors and controls on the outside ... 3 - 3, ... 3 - 9, 3 - 16

Air filter condition check ..... 4 - 7

Air pressure
Dashboard information ..... 5 - 12
Filling the system tanks from an external source ..... 7 - 21

Air suspension, check ..... 4 - 9

Air tanks, filling from an external source ..... 7 - 21

Antifreeze ..... 9 - 10

Anti-lock braking system (ABS)
Operation ..... 5 - 37

ASR ..... 5 - 27

B

Battery isolation switch ..... 5 - 5

Bus stop brake ..... 5 - 39

C

Central emergency switch ..... 6 - 2

Central locking, luggage compartment doors
Emergency operation ..... 7 - 15
Operation ..... 3 - 86

Central warnings, dashboard ..... 3 - 32

Climate control, driver’s cab ..... 3 - 74

Climate control, passenger compartment .... 3 - 75

Clutch ..... 5 - 19

Control console next to driver's seat . 3 - 30

Controls, driver's cab ..... 3 - 41

Coolant heater ..... 3 - 79

Coolant level
Check ..... 4 - 4

Courier seat ..... 3 - 67

Cruise control ..... 5 - 30

D

Dashboard ..... 3 - 29

Data of vehicle ..... 9 - 2, 9 - 5, 9 - 8

Dimensions of vehicle ... 9 - 2, 9 - 5, 9 - 8

Disclaimer ..... 0 - 3

Driver's cab ..... 3 - 28

Driver's window
Operation ..... 3 - 66

Driver’s door ..... 3 - 73

Driver’s seat ..... 3 - 23

Driving-off ..... 5 - 22

E

ECUs, fault code retrieval ..... 7 - 2

Electric power supply
Dashboard information ..... 5 - 14

Emergency escape
Through roof hatches ..... 6 - 5
Through side windows ..... 6 - 4

Engine
Oil level check ..... 4 - 2

Engine cooling
Dashboard information ..... 5 - 8

Engine oil pressure, dashboard information 5 - 9

Engine revolutions
Dashboard information ..... 5 - 11

Engine start/stop ..... 5 - 16

entertainment ..... 3 - 109

Exhaust aftertreatment ..... 5 - 26

Exterior lighting and signalling devices ..... 3 - 55

Exterior mirrors
Adjustment ..... 3 - 61
Heating ..... 3 - 63

F

Fan clutch, how to proceed in case of breakdown ..... 7 - 9

Fault code retrieval ..... 7 - 2

Fire extinguisher ..... 6 - 9

Fluids and lubricants ..... 9 - 10

Fuel ..... 9 - 10

Fuel reserve
Dashboard information ..... 5 - 10

Fuel supply, manual override of automatic shut-off valves ..... 7 - 7

G

Gearbox
Operation ..... 5 - 20

I

Identification of the vehicle ..... 2 - 2

Ignition key ..... 5 - 7

Illustrations and symbols ..... 0 - 4

Indicator lamps, dashboard ..... 3 - 33

Instrument panel ..... 3 - 31

Instruments ..... 3 - 50

Intercom system ..... 3 - 107

Interior lighting
Operation ..... 3 - 53

Interior-heating circuit, isolating valves ..... 7 - 12

Isolating valves of interior-heating circuit .... 7 - 12

J

Jump-starting ..... 7 - 16

L

Lifting ..... 7 - 18

Lubricants ..... 9 - 10

Luggage compartment doors
Emergency operation of central locking system ..... 7 - 15

Luggage compartment doors, automatic
Emergency operation ..... 7 - 13
Open/close ..... 3 - 84

Luggage compartment doors, central locking
Operation ..... 3 - 86

M

Multifunctional display ..... 3 - 35

Multiplex system
Dashboard information ..... 5 - 15

P

Parking brake
Emergency release ..... 5 - 43
Operation ..... 5 - 41

Passenger doors
emergency opening ..... 6 - 3
Locking/unlocking ..... 3 - 71
Open/close ..... 3 - 69

Power steering
Power assistance failure ..... 5 - 45

Pre-driving checks ..... 5 - 4

R

Retarder ..... 5 - 32

Reversing safety ..... 5 - 24

Roof hatches
Emergency escape ..... 6 - 5
Operation ..... 3 - 88

roof hatches
mounting after actuation of emergency handle ..... 6 - 7

Running-in ..... 5 - 3

S

Safety instructions ..... 1 - 2
Service brakes ..... 5 - 35
Service unit
Passenger ..... 3 - 91
Soap dispenser ..... 3 - 105
Spare wheel ..... 7 - 22
Speed limiter ..... 5 - 28
Steering column adjustment ..... 3 - 26
Sun blinds, electric type ..... 3 - 27
Suspension raise and lower device
Emergency operation ..... 7 - 11
Operation ..... 3 - 64

T

Tachograph ..... 3 - 52
Toilet
Operation ..... 3 - 97, 3 - 101
Towing ..... 7 - 20
Tyres
Check ..... 4 - 8
Inflation pressures ... 9 - 2, 9 - 5, 9 - 8

U

Updating of the manual ..... 0 - 5

W

washers ..... 3 - 59
Water facility ..... 3 - 94
Wheel change on-the-road ..... 7 - 24
Windscreen wipers ..... 3 - 59

LED diagnostics

The status LED light at the dashboard is a multifunctional diagnostics indicator; it supplies the following information:

1) Easy flashing after system arming: the system is properly armed.
2) Permanently lit up after system arming: this is the activation delay period of 20 seconds directly after system arming.
3) Permanently lit up with ignition switched on: the immobilizer of the security system is engaged, the system itself is disarmed.
4) Elaborate indication during emergency procedure (for description see 'emergency procedure').
5) Several flashes after disarming (flashing code): the alarm has been trigger during absence.

LED diagnostics scheme	
Number of flashes	**Security system input**
1	Pin switch
2	ignition
3	Ultrasonic detection
4	Pin switch
5	Ultrasonic anti-sabotage function
6	Self-test
7	Pin switch
8	Current consumption
9	System arming with open door

This flashing code will be erased from the LED memory the moment you turn on the ignition.

Alarm triggering

The security system can be triggered (after the activation delay) by:

- Opening the doors, bonnet or boot.
- Switching on the vehicle's ignition.
- A movement in the vehicle (if the ultrasonic detection has been armed).
- Lifting or towing away of the vehicle (only if the vehicle is equipped with a tilt sensor).
- Disconnection of the battery.

When the security system is triggered, the following occurs:

1) The vehicle's indicators flash during 30 seconds.
2) The siren sounds during 30 seconds.

In this situation the owner can disarm the security system at the usual way with the remote control. The siren is equipped with a sabotage-protection. If one of the power supply wires of the system or the siren are interrupted, the siren will sound. The vehicle's indicators will not flash in this case and the security system can't be disarmed with the remote control.

During maintenance of the vehicle

When the battery has to be disconnected during repair or maintenance activities, it is indispensable to temporarily deactivate the sabotage-protection of the siren:

1) Disarm the system.
2) Disconnect the connector of the siren; now the siren is deactivated.

Simply replace the connector of the siren after completion of the repair or maintenance activities; now the siren is activated again.

Immobilizer

The security system is provided with an immobilizer. This immobilizer engages itself automatically:

- 5 minutes after the ignition has been switched off.
- 5 minutes after disarming of the system by means of the remote control, but without the ignition being switched on.

The LED will permanently light up if the immobilizer is engaged and the vehicle's ignition is switched on.

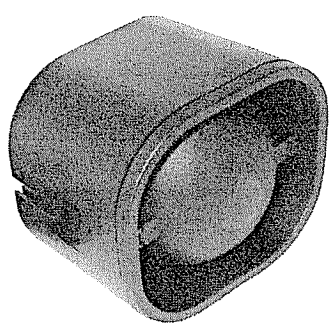
The immobilizer has to be disengaged as follows:

1) Starting... the vehicle won't start...
2) Release the key, but don't switch off the ignition.
3) Press the button of the remote control once.
4) Start again, now the vehicle will start.

When the vehicle's ignition is switched on, the immobilizer simply can't be engaged.

Maintenance

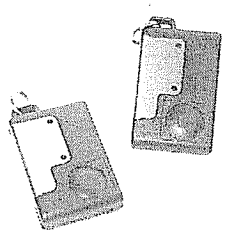
The security system is totally maintenance-free.
If you clean the engine compartment with high-pressure water, you'll have to shield the siren.
We advise a monthly check of the proper functioning of the system.



Remote control

The radiografic remote control has a rolling code; this is a digital cryptografic coding system with millions of different coding options. The code changes every time the button of the remote control has been pressed as an anti-scanning and anti-grabbing measure. This MED security system comprises two single-button remote controls with the following functions:

When the security system is disarmed and the button is pressed once, the system will arm.
When the button is pressed twice shortly after another, the system will arm without the ultrasonic interior detection and without the comfort control function.



When the security system is armed and the button is pressed once, the system will disarm.
When the button is pressed twice shortly after another, the security system sends an additional pulse to the central door locking system. This applies only for vehicles with doors which need a double pulse to open all doors; a single pulse (one press at the button of the remote control) will only open the driver's door.

Battery

If the batteries start getting empty, the security system will indicate this by generating several beep tones and LED flashing signals during arming.
Replace the batteries as soon as you can, but the remote control can still function for several weeks after this first indication.

Programming of a new remote control

The two provided remote controls have already been programmed for your security system.
Maximum three remote controls can be programmed for the system.

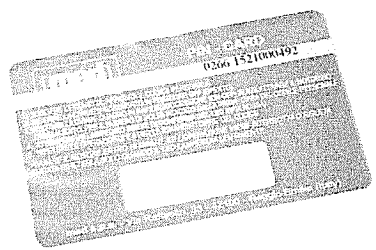
By means of the code card, you can program a new remote control.

1. Disarm the security system (LED extinguished).
2. Enter the emergency code.
3. After having completed this, the LED will permanently light up.
4. Now press three times the button of the remote control which has to be programmed.
   Each time you press the button, the siren will chirp and the LED will extinguish for a short while.
   When you hear three chirps shortly after another the remote control has been stored in the memory of the central unit.
5. If you want to program a second or a third remote control, please repeat step 4.

Emergency procedure.

You have received a CODE CARD with an emergency code mentioned on it. With this emergency code you can disarm the system, whenever your remote control may not function or has been lost. Please keep this card at a safe place, not in the car, but for example with your official car papers.
Remark: if there's a period longer than 10 seconds between the different steps of the emergency procedure, or if you made a mistake, wait for 30 seconds and try again to enter the code.
Please practise this emergency procedure once, this will prevent annoyances when you'll have to execute this procedure in reality.
The emergency procedure has to be carried out as follows:

1) Your emergency code is **for example** 2473 (your own code is mentioned at the code card).
2) Open the vehicle with the key (the alarm may sound now).
3) Put the key in the ignition.
4) Turn the ignition on and off again. The LED will light up permanently.
5) Now press **2** times the LED button; wait till the LED extinguishes and lights up again.
6) Now press **4** times the LED button; wait till the LED extinguishes and lights up again.
7) Now press **7** times the LED button; wait till the LED extinguishes and lights up again.
8) Now press **3** times the LED button; wait till the LED extinguishes and lights up again.
9) The vehicle's indicators light up during several seconds and the siren generates a two-tone signal.
10) Now you have five minutes time to switch on the vehicle's ignition, start and drive. If this doesn't happen, the immobilizer will activate itself automatically.
11) If you switch off the ignition, the immobilizer will activate itself again automatically after five minutes. You'll have to enter the emergency code again before you can start your vehicle.



Abnormal arming and disarming conditions.

Acoustical indication during arming and disarming. **□ on □ off**

The acoustical indication (a siren chirp) during arming and disarming of the security system can be switched on or off.
The default setting of this option is on.
Malfunction codes as well as alarm triggers are always generated.

Pin switch control function.

The pin switch control function prevents the security system from arming if the vehicle zones, under surveillance of the pin switches, haven't been closed (door, bonnet or boot still open). The security system will indicate this by generating three short beep tones.

Arming delay.

If the security system is armed, the user may take about 5 or 30 seconds - depending on the configuration options set – to close all vehicle zones which are under surveillance of the pin switches (bonnet, boot or doors). The security system will arm immediately and after 5 or 30 seconds the siren will sound and the car's indicators will flash if a vehicle door, bonnet or boot has been left open.

Radar detection instead of ultrasonic detection. **□ radar**

If the security system uses a radar module instead of an ultrasonic system to monitor the vehicle's interior, arming of the system goes along with three flashes of the car's indicators and three two-tone signals of the siren. Separately disengaging the ultrasonic system with an open window does not apply in this case.

Disarming the system.

1) Press the button of the remote control once.
2) The indicators will light up during several seconds and the siren generates a two-tone signal; the central door locking system will open the doors.

Abnormal disarming conditions.

Malfunction code.

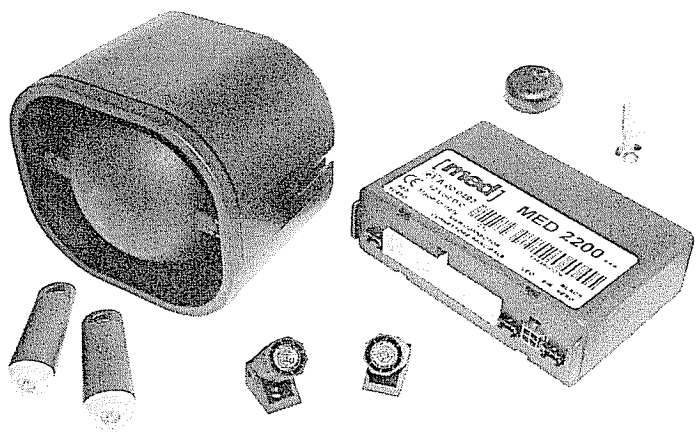
If you hear the two-tone signal after having disarmed the system, but the siren generates another tone or various tones, this is an indication of an alarm being triggered during your absence
The number of tones corresponds with the number of flashing signals of the LED (see the LED diagnostics scheme).
As long as the car's ignition is not switched on, the last malfunction code will be displayed every time the system is disarmed.

Five tones during disarming.

When you disarm the system and five tones sound from the siren, the system has performed a self-test and found a failure. Take your car to an authorized MED dealer and make him check the system.

6. If you are programming less than three remote controls, you'll have to press the button of the last remote control as often as to 'fill' all three memory positions in the central unit.
7. Switch the ignition on and off and wait for 25 seconds.
   Now the remote controls have been programmed.

The remote controls which were programmed before, but weren't pressed during programming, won't work anymore.



System configuration

The following functions can be adjusted.

code	list of functions	confirmation tone high / low	confirmation tone low / high	factory default
5	Total system shut off	off	on	off
7	Indicators during arming or disarming	off	on	on
9	Siren chirp during arming or disarming	off	on	on
11	Disengaging additional modules	off	on	off
13	Locking doors during driving	off	on	off
15	Disarming protection	off	on	off
17	siren configuration	off	on	off

In order to load a system configuration, you'll have to take the following steps:

1) Switch the ignition on and off once. Start and end with the ignition switched off.
2) The LED flashes several times and the siren generates a confirmation tone of two seconds. Now wait till the LED permanently lights up,
3) Now the system has entered the programming mode.
4) Look for the wanted function in the list above.
5) Now press the button of the remote control as often as the number of the function in the list above (e.g. 15 times for the function 'disarming protection').
6) Attention: every time you press the button, the LED must extinguish and the siren must chirp. If you don't hear the siren chirp when you press the button, don't count this time.
7) As a confirmation, the LED will swiftly flash several times and after that the siren will generate a two-tone signal during five seconds. After that the LED will permanently light up again.
8) If the programming hasn't been successfully completed or if the code doesn't exist, the LED will swiftly flash and the siren will generate swift two-tone signals after another.
9) Repeat the procedure from step 4.
10) If a second function has to be programmed, proceed to step 4.
11) Switch the ignition on and off. The LED extinguishes and the central unit exits the system programming mode.

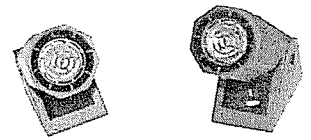
Arming the security system

With closed windows and armed ultrasonic interior detection system.

1) Pull out the keys from the ignition and leave the vehicle.
2) Check if all doors, bonnet, boot, windows and sunroof have been closed.
3) Close the vehicle with the remote control.
4) The vehicle's indicator lights flash two times, the siren produces twice a two-tone signal, the central door locking system closes all doors.
5) The LED will light up permanently.
6) The system has two different arming delays:
   After 5 seconds the door, bonnet, boot and ignition detection is armed.
   After 20 seconds the ultrasonic interior detection is armed.
7) The LED starts flashing after 20 seconds.

With open windows and disarmed ultrasonic interior detection system.

1) Pull out the keys from the ignition and leave the vehicle.
2) Check if all doors, bonnet and boot have been closed.
3) Close the vehicle with the remote control by pressing the button twice shortly after another.
4) The vehicle's indicator lights flash four times, the siren produces four times a two-tone signal, the central door locking system closes all doors.
5) The LED starts flashing.
   After 5 seconds the door, bonnet, boot and ignition detection is armed.
6) The ultrasonic system remains disarmed.



Abnormal arming conditions.

Ignition on.

If the car's ignition is switched on, the security system will not arm.

The functions below can be configured in the system and they can be armed or disarmed, depending on the vehicle's characteristics.

Preface

Thank you for purchasing this MED product. This security system is the result of combining state-of-the-art modern technologies with years of experience on the field of car security. It offers you the very highest level of security for your vehicle. This product answers to the European standards CEE 95/54 and CEE 95/56 and the Dutch SCM/TNO AA03 standard. Please take time to read it thoroughly prior to using this security system, which has been designed to provide years of trouble-free operation.
As the MED system can be configured at various ways, some of the features described below may not apply to your situation. Please ask your installer to inform you in detail!

You will receive...

When the installed security system is delivered, you will receive the following issues from your authorized installer:

- A code card which has an emergency code mentioned on it. **Important: keep it at a safe place!!!**
- This owner's manual.
- If the system needs an official approval: a copy of the official installer's certificate.

If one of the issues mentioned above is missing... **ask your installer for it!!!**

System description

- Microprocessor-driven ultrasonic security system, armed and disarmed by means of a remote control.
- Status LED-button for alarm status, alarm diagnosis memory function and programming.
- Programming of system properties.
- Surveillance of the front and rear doors by means of pin switches.
- Surveillance of the boot by means of pin switches.
- Surveillance of the bonnet by means of pin switches.
- Ultrasonic interior surveillance, self-adjusting, to be disengaged separately, provided with anti-blinding and anti-masking detection.
- Immobilizer (interruption of the starting engine) operated by the central unit of the security system (relay 20A).
- Automatically self-engaging engine- and starting immobilizers (after switching off of the engine ignition).
- Emergency disarming procedure by means of a LED button.
- Emergency disarming procedure by means of a code key (optional).
- System security by means of automatic fuses.
- Universal control option for a central door locking system.
- Control option for comfort accessories.
- Activation of the vehicle's indicators during arming, disarming and alarming of the system.
- Control of a tracking & tracing system or an additional siren.

Explanation of functions

(5) Total system shut off

If you take the vehicle to a garage for maintenance or if you won't use it for a longer period of time, you can totally shut off the security system. (Attention: don't forget to activate the system once you are going to use the vehicle again.)

(7) Indicators during arming or disarming

During arming and disarming of the system, the vehicle's indicators flash as a confirmation.
If you don't want this to happen, you can deactivate this function.

(9) Siren chirp during arming or disarming

During arming and disarming of the system, the siren generates a chirp as a confirmation.
If you don't want this to happen, you can deactivate this function.

(11) Disengaging additional modules

Together with the ultrasonic system you can also disengage the additional modules which have been connected to the accessory-output of the security system.

(13) Locking doors during driving

The option exists to automatically lock the doors at the moment the vehicle starts driving.
This function will only apply if the speed pulse signal has been connected.

(15) Disarming protection

If by accident the button of the remote control is pressed, the disarming protection will arm the system again automatically.
If the vehicle is disarmed with the remote control, and no door or hood is opened within 40 seconds, the system will arm itself again.

(17) Siren configuration

The siren can generate two different tones, which you can program here.

Optional emergency code keys have been depicted in this manual, but were not described.

[med]
making the difference

Your dealer:

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Technical modification without notice.

[med]
making the difference

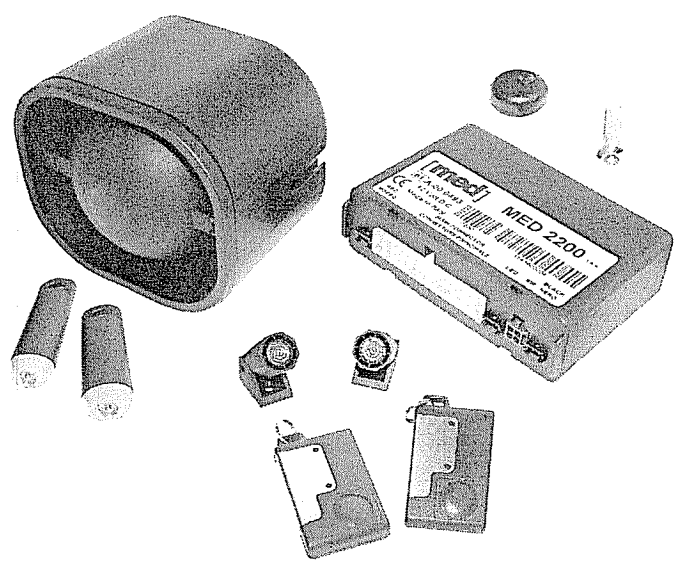
Owner's manual

MED 2200

Security system

for vehicles without

original remote control



Technologies

***Fogmaker*® is a registered trade mark for fire extinguishers used to protect engine compartments of fork lifts, front loaders, forestry and construction machines, buses or other heavy vehicles, engine compartments and cockpits of racing and rally cars, engine compartments of veteran cars, engine and fuel tank compartments of leisure boats and other small boats.

Fogmaker® Universal will work and discharge the extinguishant regardless of the position or angle in which it is installed or hangs when it is activated. It uses a patented solution to offer a safer function than traditional, bottle-type fire extinguishers. The difference is that traditional extinguishers use a vertical evacuation pipe, which could reduce or completely take out the effect if the extinguisher is activated when it is held or hangs in an upside down or close to horizontal position.

Fogmaker® Universal is designed for do-it-yourself installation. It is easy to install and dismantle for servicing or refilling. The extinguishant consists of water, an anti-freeze saline solution and a film-forming chemical, which prevents reignition of any leaking fuel.

PRODUCT DATA

Type ID .....

Serial number .....

Date of delivery .....

Fogmaker® Universal is manufactured and marketed by:

FOGMAKER INTERNATIONAL AB

Box 3204
SE-352 53 VÄXJÖ
SWEDEN

Phone: +46 470 243 40
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Homepage: http://www.fogmaker.com

Fogmaker® Universal *User Manual*

FOGMAKER INTERNATIONAL AB

User Manual
Fogmaker®Universal

Water-mist fire extinguisher
for permanent installation.

Effective against burning petrol, diesel and other liquid fuels
in engine rooms and other enclosed spaces.

Fogmaker® is a registered trade mark of the fire extinguisher described in this manual. It is designed for extinction of burning petrol, diesel, oil etc. in engine rooms or other enclosed spaces. The extinguisher uses a cold water-mist, which reduces the temperature very effectively. At the same time it drives out the air, so that the oxygen level is reduced. Full effect is obtained when the extinguishant is vaporized.

Fogmaker® Universal consists of the following parts:

General description	Section 1.1
Installing the Cylinder	Section 1.5
Valve Hose	Section 2.2
Release Valve	Section 2.1
Manual Activation	Section 3.1
Electrical Activation	Section 3.2-3.3
Pneumatic Activation - Firetrace	Section 3.4
Pipes	Section 4.1-4.2
Couplings	Section 4.3-4.3.2
Firetrace Components	Section 4.5
Nozzles	Section 4.6
Double-assembled Extinguisher	Section 5
Cover Boxes	Section 5
Installations in Racing Cars	Section 5.3
Functionality Check after Installation	Section 6
Measures in the Event of Fire	Section 7
Measures after Fire	Section 8
Checklist Schedule	Section 9
Restoring the Function after a Fire	Section 10
Winter Storage	Section 11
Technical Data	Section 12

The pipes are not exposed to pressure until the release valve has been activated.

12. Technical Data

Type	**Universal 33 Measures (mm)**	**Universal 40 Measures (mm)**
Diameter excl. assembly fittings	152	152
Maximum measure from wall incl. assembly fittings	165	170
Maximum width incl. assembly fittings	152	390
Length (height) incl. valve	400	445
Hole distance on assembly fittings	w 350, h 280 (M8)	
Weight		
Filled cylinder incl. assembly fittings (approx. kg)	11	23
Volume, pressure		
Volume, extinguishant (approx. litres)	3.3	4.0
Volume, driving gas (approx. litres)	66	80
Load pressure (at +20^{o}C)	100-105 bar	100-105 bar
Test pressure, cylinder (bar)	144	144
Materials		
Cylinder	Extruded durable aluminium	
Assembly fittings	Aluminium, stainless stell fastening clamps	
Valve	Brass, components of stainless steel	
Anodizing, all aluminium parts, interior & exterior	Min 20 µm	Min 20 µm
Discharge time (approx, seconds)		
2 nozzles	120	
4 nozzles	60	78
6 nozzles	40	52
8 nozzles	30	39
	Fogmaker 66	Fogmaker 80
10 nozzles	48	62
12 nozzles	40	52
Nozzle flow at 100 bar	Approx. 80 litres/hour per nozzle	
Other specifications		
Driving gas	Nitrogen	
Extinguishant	Water, antifreeze and film-forming agents	
Anti-freeze temperature (standard)	-35^{o}C	

Functionality tests and technical approvals:

Institute	**Standard**	**Date**
SAQ Kontroll AB	AFS 1994:39	97-02-12
Pressure vessel approval	(-40/+65^{o}C)	
Swedish National Testing and Research Institute (SP)		
Swedish Administration of	Extinguishing test	96-06-18
Shipping and Navigation Regulations 1996-01-11	in 5 m^3 space	
International Car Sport Federation (FIA)	Art. 253 Safety Equipment	96-12-02
Homologation No. Ex.001.97, Techn. List No. 16	(Groups N, A, B, ST)	
Swedish Administration of		
Shipping and Navigation	Type approval	97-02-04
Leisure boats, engine compartment < 5 m^3		
Swedish Fire Safety Association (SBF)	RUS 127	98-05-18
Approval of extinguishing capacity in peat loader		
Fullscale test (SBF) for homologation with		
regard to water quantity.	SBF 127	01-09-15
Approval extinguishing capacity 1.2 litres/m^3	SBF 127	01-09-15

10 Effects of Activation

In normal circumstances, ***Fogmaker® Universal*** does not affect the function of engines. If extinguishant should be sucked into the air intake of the engine, this normally does not affect the performance. You may, however, experience difficulties starting diesel engines since the incoming extinguishant contains water. Please note that the extinguishant can cause corrosion damage if the engine is not restarted shortly after a fire. As a precaution, pour a little oil into the cylinders and run the starter engine for a few seconds. The function of the electrical system can be affected by the saline solution of the extinguishant, resulting in unwanted flashovers if the system is not cleaned as soon as possible. After removing the cause of fire and cleaning the protected equipment you can begin using it again, provided the fire itself has not caused any damage which must be repaired first.

10.1 Restoring the Function of *Fogmaker®Universal* after Extinction

When ***Fogmaker® Universal*** has been used, the cylinder must be refilled with extinguishant. This should be done at an authorized service station.
Take the following steps when Fogmaker is dismantled for maintenance and service:

1. Unfasten the coupling between the release valve and the hose that connects the cylinder to the piping.
2. Disconnect the pull-cable(s) from the release valve.
3. Remove the cylinder from its assembly fitting and bring it to an authorized service station for checking and refilling.
4. Remove the nozzles and flush the system using a mixture of water and rinsing fluid (rinsing fluid and tools for this purpose can be ordered from Fogmaker). When this has been done you should blow the pipes clean with compressed air
5. Rinse the nozzles under running water and blow them clean using compressed air.
6. Check the O-ring packing on the nozzle. Replace if required.
7. Reinstall the nozzles.
8. Clean and reinstall the protective hoods on the nozzles, or fit new hoods.

When the cylinder has been refilled, reinstall it using the same procedure as when you first installated it.

11 Winter Storage

Since the extinguishant of ***Fogmaker® Universal*** contains water, it normally includes an anti-freeze agent for temperatures down to about -35°C, if nothing else has been agreed.

If ***Fogmaker® Universal*** is installed in an unheated space under winter conditions where the temperature might fall below the freeze protection limit, the extinguisher must be removed for the winter.

Dismantling is done in the same way as after a fire (section 10.1). **If the cylinder has not been activated, you must first secure it with the safety screw.**

WARNING

When dismantling a cylinder that has not been discharged, you must fasten the safety screw (7) before disconnecting the piping and activation device. Insert the safety plug into the valve outlet before the fire extinguisher is removed from the vehicle or filled/serviced on location.

1. Extinguishant Cylinder

1.1 General Description (Fig. 1)

The cylinder (1) of Fogmaker 33 is made from extruded aluminum alloy. It has been anodised to about 20 my, which makes it extremely resistant to corrosion even in very demanding environments, for example exposure to saline sea air. The bottom of the cylinder is equipped with a refilling valve (2) for driving gas. The lid is equipped with a refilling valve (3) for extinguishant, release valve (4), valve outlet with safety plug (5), pressure gauge (6), transport safety screw (7), detector gas connector (8) and power inlet for an electrical extinguisher (9). The installation kit includes an assembly fitting (10) and fastening clamps (11). ***Fogmaker® Universal*** is also available in a double-assembled model. ***Fogmaker® Universal*** 66, 80 (Fig. 1D).

WARNING

It is strictly forbidden for unauthorized personnel to tamper with the valve or lid of a pressurised cylinder. This may release the pressure of the cylinder and cause serious injury to a person. You must not remove the safety screw (7) until the installation has been completed!

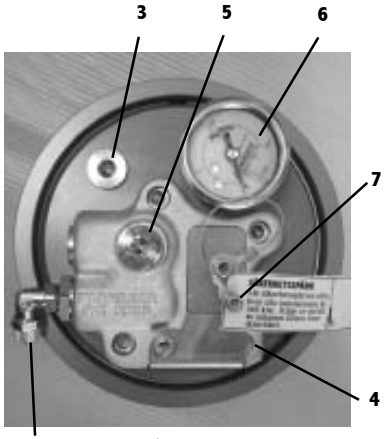


Fig. 1 B

Fig. 1

Fogmaker Universal 22, 33 and 40

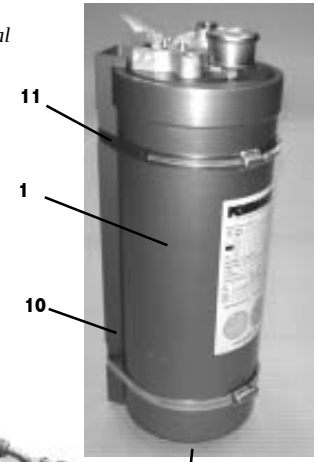


Fig. 1 C

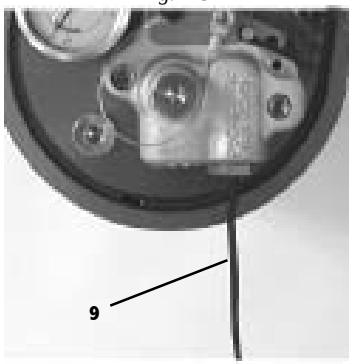
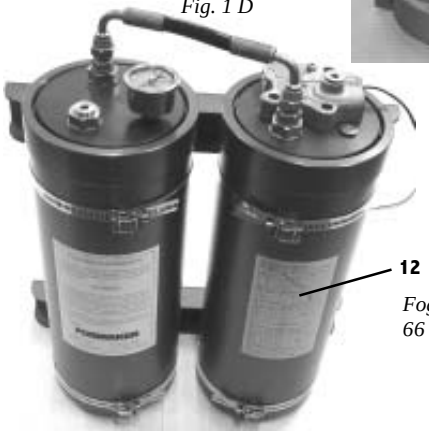


Fig. 1 D



Fogmaker Universal 66 and 80

1.2 Extinguishant

The extinguishant consists of water, an anti-freeze agent (-35 ^{o}C) and other additives, the purpose of which is to facilitate extinction and prevent reignition.

1.3 Continuous Check-ups

The extinguisher should be checked regularly (see Section 9). Functionality tests and refilling should be carried out by authorized personnel in accordance with the specifications on the cylinder service label. The cylinder (Fig 1) should be checked regularly for any visible damage or defects. The pressure is checked by reading the pressure gauge (6), which should indicate about 100 bar. If the pressure is below 90 bar at +20°C the extinguisher should be refilled, in order to ensure full functionality. ***Fogmaker® Universal*** also works at lower pressure, but the size of the water drops will increase, resulting in less effective formation of water-mist. The extinguishing effect is optimized at a pressure of approximately 70-100 bar.

1.4 Refilling

On delivery, the fire extinguisher is pressurized and filled with extinguishant. Refilling should be done at an authorized service station. A special tool is required to refill the cylinder. The cylinder contains driving gas (nitrogen), which is refilled from the bottom of the cylinder through a valve (2). If you refill the cylinder shortly after it has been discharged, the original driving gas can be recompressed and used again. If the cylinder has been disassembled for servicing you must, however, refill both driving gas and extinguishant.

1.5 Installing the Cylinder

Install the cylinder close to the room that is to be protected, using the assembly fitting (10) and clamps (11, Fig. 3) that are included in the installation kit. Screws are not enclosed since you may need different types depending on where and how the cylinder is to be installed. The assembly fitting, or the installation profile, should be fixed in such a way that there is enough free space around the release valve to connect the pipes to the nozzles, the release pull-cable(s) and an electrical release equipment, if required. The cylinder can be set up in whichever position you want, but make sure that the pressure gauge can be checked. If it is not possible to install the cylinder with the pressure gauge fully visible, we recommend that you use an electrical pressure alarm. For instructions on how to install pipes, nozzles and activation devices, see sections 3 and 4.

Fig. 2A

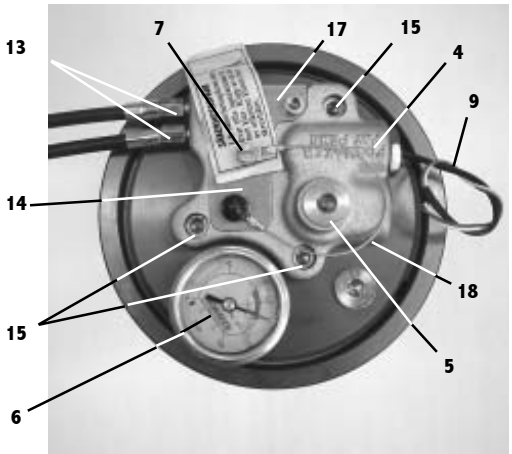
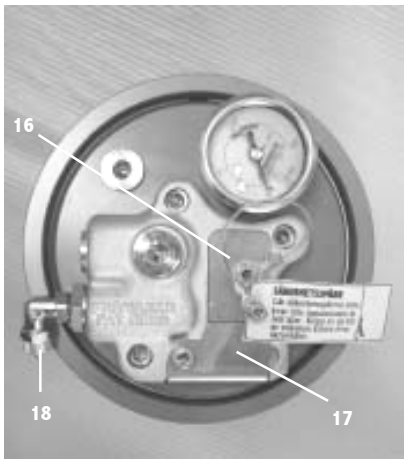


Fig 2B



9. Checklist Schedule - Fogmaker Fire Extinguisher and Sprinkler System

The extinguisher system should be checked once a year using the checklist below.
Every four years, an extended check-up of the cylinder should be carried out and the extinguishant replaced. Extended check-ups can only be done at an authorized service station.

Checklist - Daily Check-up
Check that the pressure of the cylinder is not below 90 bar and the detector pressure (Firetrace) at least 15 bar. This check-up is not required if you use an electrical activation device.

Checklist - Annual Check-up			**Notes**
9.1	**Extinguisher cylinder**		
9.1.1	Assembly fittings, fastenings	X	
9.1.2	Cylinder clamps, fastening	X	
9.1.3	Check pressure gauge, min 90 bar	X	
9.1.4	Visible leaks	X	
9.1.5	Marking label, check-up	X	
9.1.6	Yellow labels, check-up	X	Serial number, next service
9.1.7	555 or equivalent on valve mechanism	X	
9.2	**Pull-cable (one or two cables)**		
9.2.2	*Fasten the safety screw*	*X*	
9.2.3	Functionality check, lubrication	X	
9.2.4	Pull-handle and safety catch	X	
9.2.5	Sticker ”Fire” on handle, change if required	X	
9.2.6	*Remove the safety screw*	*X*	
9.3	**Sprinkler system**		
9.3.1	Pipes/hose – cracks, fractures etc.	X	
9.3.2	Pipes/hose – clamps, sagging X		9.3.3
Test blowing, compressed air		X	Check free flow through all nozzles
9.3.4	Tighten pipe/hose couplings and nozzles	X	
9.3.7	Nozzle spray direction, check-up/adjustment,	X	
9.4	**Detection system, electrical**		
9.4.1	Cable circuit - crushing, cracks, fractures	X	
9.4.2	Alarm circuit and alarm, check-up	X	
9.5	**Detection system, Firetrace**		
9.5.1	Visual inspection of Firetrace hose and its fastenings	X	With regard to wear, heat and aging defects.
9.5.2	Alarm circuit and alarm, check-up	X	

Systems in accordance with SBF 127
See special checklist for each system.

For electrically triggered systems there are additional checks, which are described in the relevant user manual.

7. Measures in the Event of Fire

The following measures should be taken in case there is a fire in the protected room:

1. Stop engines and ventilators

2. Turn off the electricity

3. Shut, if possible, the doors/hatches to the room

4. Activate ***Fogmaker® Universal***
   If the system is not fully automatic or if it is in manual mode:
   Use the pull-cable(s) or press the release button

5. Shut down the fuel supply to the engine

6. If possible, keep the protected room closed for five minutes after extinction.
   You should have a hand-held extinguisher prepared, if the fire should flare up again.

8 Measures after Extinction

Fogmaker® Universal contains an anti-freeze agent, a corrosion inhibitor and a film-forming liquid (which is decomposed by nature's own organisms). However, when the extinguishant dries up, the corrosion inhibitor loses its effect. In order to avoid corrosion, you should clean any metal parts as soon as possible after the system has been discharged. This is done by rinsing the equipment with fresh water, preferably using a high-pressure washer. We also recommend that you use an alkaline detergent, to facilitate the removal of the film-forming chemical. If this is not done properly, any remaining film may gather dust and dirt.

NOTE

In order to protect the engine, electrical fittings and other metal parts from corrosion, you should wash away any remains of dried or damp extinguishant as soon as possible after the extinguisher has been discharged (preferably using a high-pressure washer). This should always be done, whether the extinguisher has been activated in connection with a fire or for any other reason.

2. Release Valve

WARNING

When the safety screw (7) and the protective cover (17) have been removed, ***Fogmaker® Universal*** *can be accidentally activated by a slight pressure to the release catch which is located under the protective cover (16). The release valve must not be dismantled if the cylinder is pressurized. If the valve or any of its nipples are removed when the cylinder is under pressure a liquid jet, strong enough to injure a person seriously, will be discharged.*

2.1 Release Valve (Fig. 2A, 2B)

Fogmaker® Universal can be activated manually, electrically from a control panel, or automatically through a detector circuit, see Fig 2A. The valve could also be automatically activated using a pneumatic device (Firetrace), see Fig. 2B.
Fogmaker® International AB provide a range of central units – manual, semi-automatic or fully automatic - which can be used to control the electrical release device. Contact your retailer for further information.

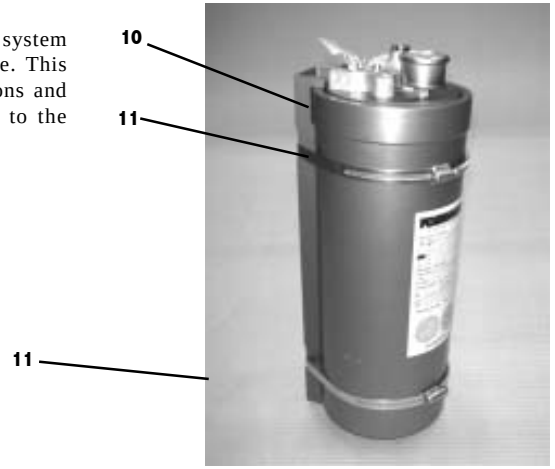
The release valve (4) is attached to the lid of the cylinder (15). The valve has an outlet opening (5) for the extinguishant. For security reasons the outlet is equipped with a safety plug, which should always be inserted before you service or transport a pressurized cylinder. There are two sockets for pull-cables (13). The valve is secured from accidental activation by a safety screw (7), which should always be in place when servicing or installing/dismantling the extinguisher and when transporting a pressurized cylinder. Electrical activation connector cables (9). Two protective covers (16 and 17) will prevent dirt from affecting the function of the release mechanism. The safety screw should be removed when the cylinder has been installed and you want to take the extinguishing system into operation. At all other times the safety screw should be mounted, in order to prevent unintentional activation. Keep the safety screw hanging by the wire (18) when you have unfastened it.

Fig 2B displays the fully automatic pneumatic valve and the connector for the pneumatic hose (18). Pneumatic detection can not be combined with pull-cables. For mechanical activation of Firetrace, see section 3.

2.2 Valve Hose

The valve outlet and the sprinkler system are connected through a valve hose. This hose is designed to absorb vibrations and thereby prevent vibration damage to the pipes.

Fig. 3



3. Activation Devices (Fig. 4A, 4B, 4C)

Fogmaker International supply devices for manual activation with pull-cables, for electrical or pneumatic activation, see sections 3.2 - 3.3.

3.1 Activation Pull-cables

Two activation pull-cables can be connected to the electrical/mechanical valve, see Fig. 4B and 4C. The cables are fixed to a wall etc. with steel rubber clamps and sheet-steel screws. Clamps should be used approximately every 30 cm along the wire casing.

It is important that you install the cable in such a way that there is no risk of fractures. You should also make sure that any curves on the cable are not so sharp that activation is made difficult or obstructed. The pull-handle should be installed in an easily accessible place outside the area ***Fogmaker® Universal*** will protect in case of fire. When the extinguisher is installed in a vehicle, one handle should be placed next to the operator's/driver's seat and the other on the outside of the vehicle. The handles are equipped with a catch (see Fig. 4D).
The outside handle should be placed so that it can not be affected by, for example, a branch or any other outer obstacle. If used in a competition car (racing/rally), the handles should be labelled with an (E) sticker.

In order to ensure adequate function of the pull-cables, please follow these instructions:

1 Drill an 8 mm hole where the handle is to be placed. Unscrew the outer of the two M8 nuts and insert the cable holder "from the back". Attach the safety catch, if this is to be used, and fasten the outer M8 nut again and pull it tight. Then, pull the M8 nut "on the back" tight.
2 Attach the enclosed M5 nut and the T-handle to the cable. Lock the T-handle in a suitable position with the M5 nut. It is particularly important, if the safety catch is used, to make sure that it can be opened/closed with an adequate inertia.
3 Use clamps to secure the cable casing except for the last 50 cm closest to the valve.

WARNING

*Make sure that the valve safety screw (7) is mounted, before you start installing the pull-cables, so that **Fogmaker® Universal** is not accidentally activated during the installation.*

4 Remove the valve protective cover by unscrewing the socket screw 19
5 Use the T-handle to pull the cable about 12-15 cm out of the casing. Cut the casing to a suitable length.

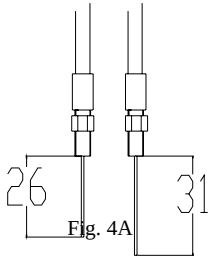


Fig. 4A

Fig. 4B

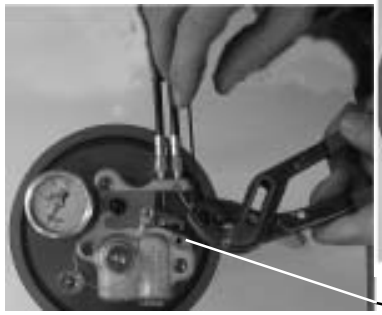
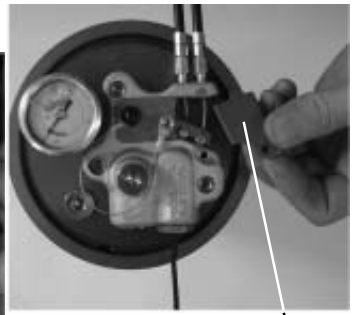


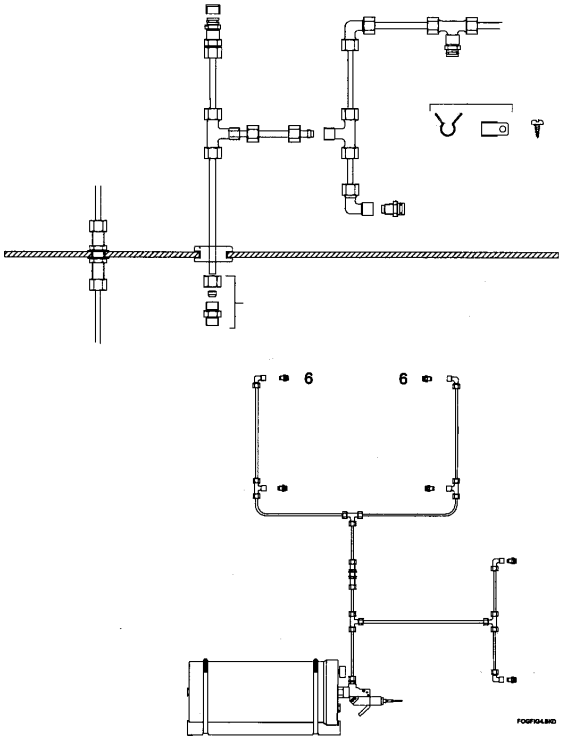
Fig. 4C



Installation

Fig. 15A

Example of pipe and nozzle installation



6. Functionality Check after Installation

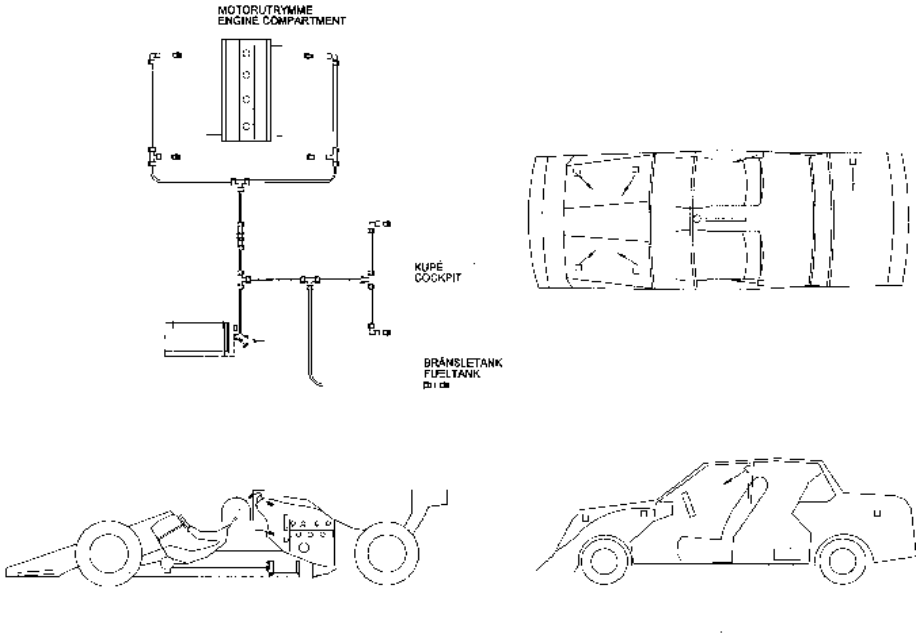
6.1 Fogmaker® Universal has been subjected to functionality and leakage tests for at least two weeks as part of the production process and it will work when activated, provided that activation devices and the piping have been correctly installed and that the safety screw has been removed. It is therefore not necessary to test the extinguisher itself. If you are in any doubt about the functionality of the system, you should contact an authorized service station for a check-up.

6.2 Check the piping for leaks using compressed air, which you connect to the pipe end where the extinguisher will be connected. Then, apply leak spray to all couplings and joints and observe them.

6.3 Firetrace is checked after the valve has been pressurized with detector gas, after which all joints and couplings should be tested with leak spray. Repair any leaks. The pressure gauge of the Firetrace system should then be observed daily for at least a week. After this you make a new test using leak spray. Check that the resistance of the alarm cable is correct, 0 ohm.

6.4 For electrical systems you should check that the wiring is OK and that there are no defective connections. Check the detector circuit and the power supply inlet on the valve using a measuring instrument. The resistance of the detector circuit should be 1 kohm. The power inlet should be between 1.5 and 2 ohm. Make a system test by pushing the test button of the central unit or control panel, (only rus and 1717)

Fig.15B



5.3 Installation in Racing Cars

Singel-seaters should be equipped with four spray nozzles in the engine compartment, one of which should be directed down towards the bottom plate of the engine compartment.
One nozzle should be placed either to the left or the right of the driver's helmet, pointing towards his/her knees.

The same principles apply when installling Fogmaker in the engine compartment of a standard car. Inside the cockpit, you should place one nozzle on each B post, as high up as possible. Install the nozzles pointing crosswise down towards the driver's/passenger's feet. This means that the nozzle on the right-hand B post should be directed towards the passenger's feet. Make sure that the water-mist is not obstructed by the driver or passenger.

These systems should be equipped with double activation devices. The first should be easy to reach for the driver, while the other should be placed on the outside of the car, clearly visible. Both activation devices should be labelled with an (E) sticker.

6 Push the cable out of its casing again and attach the end socket/tensioners on the casing.
7 Cut the cables to 26 and 31 mm, respectively (Fig.4A). Slip the cable through the M6 hole of the valve housing and screw on the cable tensioners.
8 Attach the cable screw-nipples (see Fig. 4B)
9 Insert the cable nipples into the milled-out grooves of the release catch, (Fig. 4C). Fasten the cover (16). The cover will hold the cable nipples in place.
10 Fasten the last clamp as close to the valve as possible, in order to ensure that the cable casing is properly fixed so that it can not move.

WARNING

When checking that the cable runs smoothly, the safety screw (7) of the release valve must be mounted. This way the extinguisher will not be activated when you pull the handle, but you will be able to establish that the cable runs smoothly and that the gap is sufficient (1-5 mm). You should test the cable before it is attached to the valve.

3.2 Electrical Activation

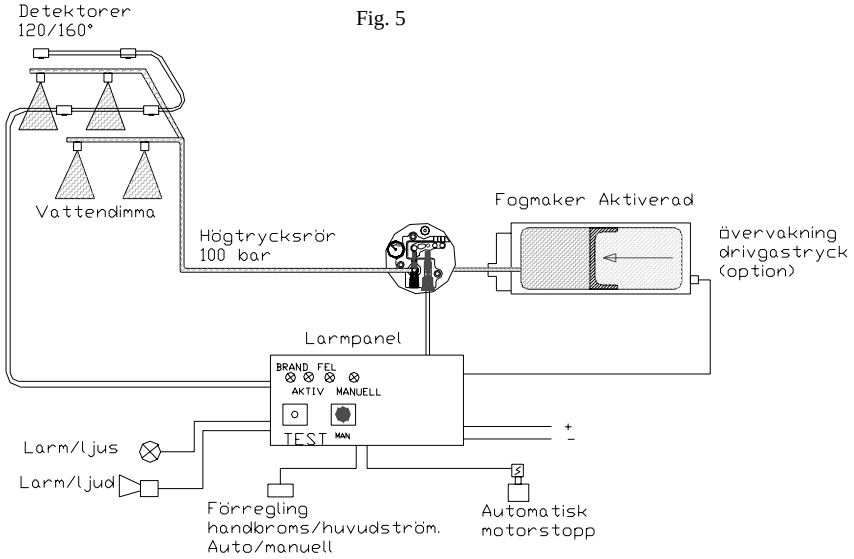
As an alternative to manual activation, the valve can be activated electrically. The operator activates the unit manually by pushing a button which activates and discharges the extinguishing system electrically. Activation pull-cables can be combined with electrical activation.

3.3 Detector Activation

If ***Fogmaker® Universal*** is installed to protect an unattended space, you need a fully or semi-automatic system which triggers extinction through detectors and a central unit in case of fire.

Detectors, which react to, for example, increasing temperature, smoke or visible flames, can be used. Fogmaker International AB has developed several types of central units and alarm panels for different applications. We offer optional accessories such as visual and acoustic alarms as well as automatic engine, fuel and electricity shutdown mechanisms. Contact Fogmaker or your retailer for further information. For installation instructions, see the user manual concerned.

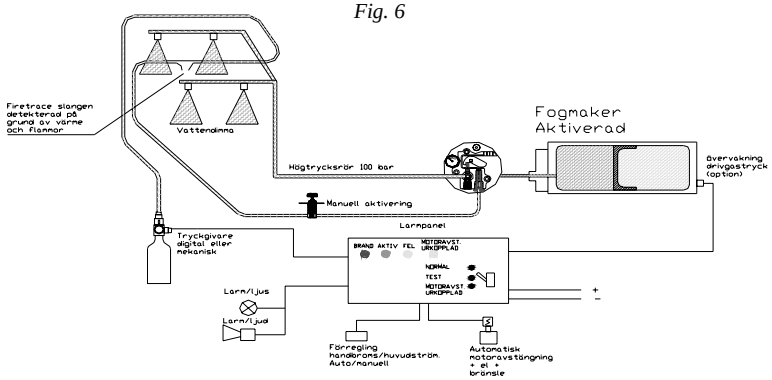
Fig. 5



3.4 Pneumatic Activation - Firetrace

Firetrace is a fully automatic, pneumatic system. The system consists of a detector gas cylinder and a polymer hose, which is installed in the engine room at ceiling level round the engine. In the event of a fire the hose is burnt off, the pressure drops and the valve of the Fogmaker cylinder is automatically opened to discharge the extinguishant into the nozzle system. The detector gas cylinder is equipped with a connector for a pressure guard. The hose can be punctured by hand using a manual activation device (not standard equipment). Optional accessories are alarm panels, visual and acoustic alarms, as well as automatic engine, fuel and electricity shutdown mechanisms.

Fig. 6



4. Pipes, Couplings and Nozzles (Fig. 11-11A)

4.1 Pipes

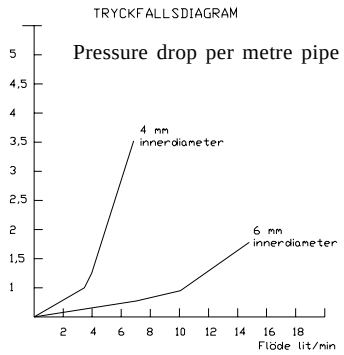
The standard kit includes 6 x 0.8 mm soft, treated copper pipe (1) of the required length in accordance with your order. As an alternative you can use pipes of steel (stainless or not) or steel-reinforced rubber hose, as well as combinations of these. Copper pipes are, however, easier to handle if you are doing the installation yourself. They can be bent into flexible curves, which can be adapted to the layout of the protected room. The pipes can not, however, be bent too many times, as the material hardens. If the pipe has to be rebent it must first be annealed.

Pipes of plastic or other materials can not be used, since they may burst because of the high pressure. According to the motor sport regulations of FIA valid from 1 January 1998, the piping must consist of a fire resistant material.

4.2 Pressure Drop

The Fogmaker system uses high pressure. Therefore it is important to use the appropriate dimensions for the pipes so that unneccessary drops in the pressure are avoided. If the pressure should drop, the efficiency of the system is reduced.

The chart displays the pressure drop per metre pipe when using 6x1 mm copper pipe and 8x1 steel pipe, respectively. The drop should not exceed 1 bar per metre. For information on the flows which should be calculated, see section 12 Technical Data. For long distances we recommend that you use 8 mm pipes for the feeder line and 6 mm pipes for the nozzle branches.



When cutting the pipes into suitable lengths a special pipe cutting tool should be used, to avoid leaving burrs in the cut-off pipe ends.

5. Double-assembled Extinguisher, Cover Boxes

5.1 Double-assembled Extinguisher (Fig. 14)

FOGMAKER ® Universal is also available in a double-assembled version suitable for large machines and vehicles. The volume of extinguishant is doubled to 6.6 litres, providing enough capacity for a sprinkler system with 11 to 15 nozzles. The maximum capacity of a ***FOGMAKER ® Universal*** with 3.3 litres of extinguishant, is 6 to 8 nozzles.

The double-assembled extinguisher is fixed to its assembly fittings when delivered, and the cylinders are connected with a hose (se Fig. 14). When installing the cylinders you must not disconnect them from the assembly fittings, since this might affect the connector coupling between the hose and the lid of the cylinder and cause leakage.

5.2. Cover Boxes (Fig. 13)

Fogmaker International AB market a cover box of powder coated sheet-steel for single as well as double-assembled cylinders. These boxes are primarily used for outside assembly on vehicles and machines that are used in difficult conditions.

Cover box

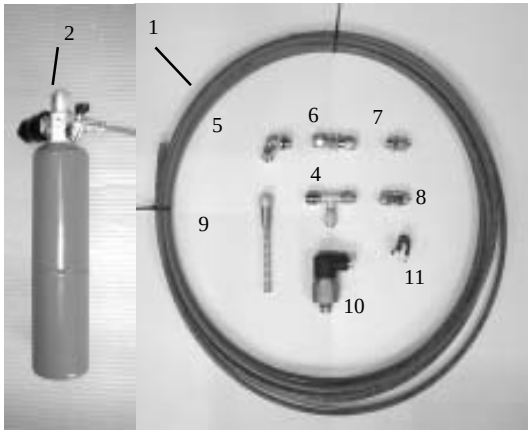
Fig. 13

Double-assembled extinguisher 6,6 and 8 litres

Fig.14

4.5 Firetrace

Fig. 10



Firetrace Installation Kit
1. Detection hose
2. Detector gas cylinder with pressure gauge, valve and pressure guard, filled on delivery, 18 bar.
3. 2 cylinder assembly fittings (not in picture)
4. T coupling.

You can order the articles below:
5. Angle 1/8”-6
6. Bulkhead fitting 6-6.
7. End coupling 1/8”-6
8. Joint 6-6
9. End coupling with protective spring 6
10. Pressure guard for alarm
11. Rubber clamp 6 mm with screws
Manual activator (cuts hose)
(not in picture).

4.6 Nozzles

The nozzle consists of a body (1) with a built-in turbulence former and a fixed, sintered filter (2). Around the body an O-ring (3) is placed. The end of the nozzle has a hole from which the water-mist is discharged. To prevent the hole from getting clogged up by dirt, dust etc. a protective hood (4) is included in the delivery. This hood should remain on the nozzle after installation. It will be forced off by the released pressure when water-mist is created. When assembling the nozzles you should use a thread-locking liquid or thread-tape. **Please note, that it is very important to make sure that the thread-tape does not come loose and enter into the piping, since this could obstruct the nozzle filters.**

Fig. 11

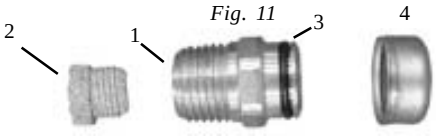


Fig. 12

Install the nozzles in “the ceiling” of the protected room. They should be 70-90 cm apart and 30-45 cm from a wall in order to obtain the most effective distribution of the flow. The nozzle will spray the water-mist in a cloud, at an initial spreading angle of approx. 110°. The spray will bend off at a point about 20-25 cm from the centre of the discharge. It will then spread with full force in the form of a pillar with a diameter of 50-60 cm at a distance of about 100 cm from the nozzle. The flow from separate nozzles should be directed so that the mist-clouds do not neutralize each other (“collide”). There should be as few objects as possible in the way, so that the formation of mist is not affected.
Fire extinction will become more effective if the nozzles are directed towards spots where a fire might start, for example the atomiser pipes of a diesel engine or the carburettor of a petrol engine. Preferably, the mist should hit some hot components, for example the turbo, since this will speed up the vaporization and thereby the extinction.

The pipes are installed with clamps (Fig. 9 A och B) and screws. Use one clamp per 30 cm of pipe. We recommend that you use clamps on both sides of couplings. Use a sufficient number of clamps, so that the pipes do not vibrate or sag.

IMPORTANT

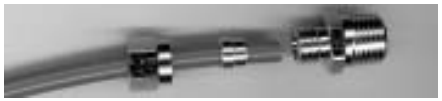
Blow the pipes clean before installing the nozzles. Any filings and burrs may reduce the diameter of the pipes and nozzles, resulting in restricted throughflow of extinguishant ***when Fogmaker® Universal is activated****.*

4.3 Installing Pipes

When the pipes have been cut to a suitable length and the ends have been cleared as described in section 4.1 you proceed by installing the couplings. The pipe you are going to connect to the release valve must first be drawn through the wall separating the protected room and the area where the extinguisher will be installed. To do this you need a bulkhead fitting of nickel-plated brass (Fig. 9 A and B), which is a standard item in the installation kit. Connect the pipe to the bulkhead fitting. On the outside of the wall you should now install the valve hose which connects the extinguisher valve to the sprinkler system.

How to connect pipes and couplings:
- slip the nut onto the pipe end
- slip the inner clamp ring on the pipe end. NOTE: make sure it is in the right direction!
- insert the pipe end into the coupling, lubricate the thread and sleeve using copper grease and pull the nut tight, thereby locking the clamp ring
- check that the pipe is properly locked in the coupling

Fig. 8



Tighten the nuts, first by hand and then another 3/4 of a turn using a tool.

Install the nozzles using angle couplings (type 2 Fig 9 A) or T-couplings (type 6 Fig 9 B) in combination with sleeve couplings (type 13 Fig. 9 B). You can also use pipe ends in combination with end couplings (type 4) where the nozzles can be installed. Bend the pipe to the smallest possible radius, without deforming the pipe, so that the nozzle, when it has been installed, points inwards and downwards towards the specific area you want to protect. These couplings are not included in the standard installation kit, but they can be supplied if you place a special order for the required quantity. Fix the nozzle using a suitable mounting or a clamp so that the nozzle is not dislodge out of position.

4.4 Couplings

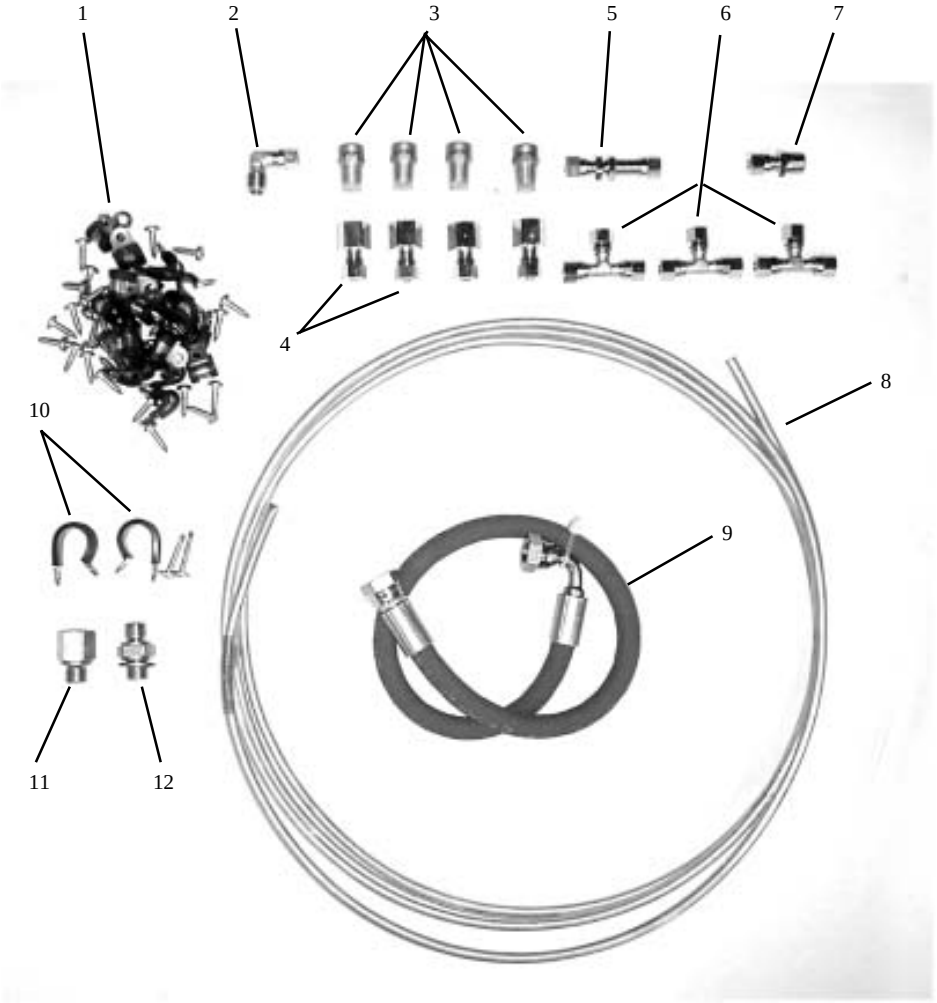
The standard kit includes the following brass clamp ring couplings. (NOTE: If steel pipes are installed, you must use steel couplings.)
- Valve hose with nipples (9, 11 och 12 Fig. 9 A and B) used to connect the valve to the piping (see separate installation instructions enclosed with the hose kit)
- Straight nozzle coupling (type 4 Fig 9 A) for nozzles (quantity = number of nozzles).
- T-coupling (type 6, Fig 9 A) for joining pipes or for direct mounting of nozzles using double-sleeve couplings (type 13, Fig. 9 B).
- You can also order the required number of angle couplings (2) for direct connection of nozzles.

4.4.1 Coupling Kits

Examples of kits
The standard installation kit includes clamp ring couplings of brass as illustrated on page 10.
(NOTE: If steel pipes are installed, you must use steel couplings.)

The following items are included in the kits. Kits can be ordered for 2-6 nozzles.
Installation kit 1504: (1) 6 mm steel rubber clamp with screw. (2) 90° angle coupling 6x1/4" male (not standard). (3) Nozzle with filter and protective cover. (4) End coupling 1/4"-6 male. (5) Bulkhead fitting 6-6. (6) T-coupling 6-6-1/4". (7) End coupling 1/4"-6 male. (8) Copper pipe 6x1 6,2 metres. (9) Valve hose. (10) Valve hose clamp with screw. (11) Sleeve coupling 1/4"-1/4" female. (12) Adapter 1/4" male-1/4" female.

Fig. 9A



Installation kit 1514: (1) 6 mm steel rubber clamp with screw. (2) 90° angle coupling 6x1/4" male (not standard). (3) Nozzle with filter and protective cover. (4) End coupling 1/4"-6 male. (5) Bulkhead fitting 6-6. (6) T-coupling 6-6-1/4". (7) End coupling 1/4"-6 male. (8) Copper pipe 6x1 6,2 metres. (9) Valve hose. (10) Valve hose clamp with screw. (11) Sleeve coupling 1/4"-1/4" female. (12) Adapter 1/4" male-1/4" female. (13) Sleeve coupling 1/4" male-1/4" female.

Fig. 9B